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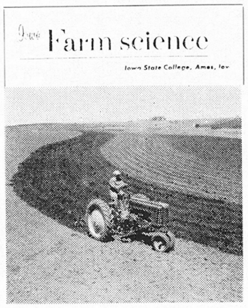
Iowa Farm science

Iowa State College, Ames, Iowa



The photo on this month's cover shows a western Iowa cornfield being planted by contour listing — an increasingly popular practice in the western part of the state. For more information on soil management practices, see the Experiment Station report section beginning on page 13.

in this issue

March Iowa Farm Science Reprints

(available about mid-month)

FS-745 What's Happening to Farm Size?
FS-746 Orchardgrass—Its Use on Iowa Farms
FS-747 What Kind of Ham Do People Want?
FS-748 Spotlighting Church-Community Programs
FS-749 Prices of Iowa Farm Products (1930-57)

chat with the editors

What's YOUR Opinion on the— "CHALLENGE TO IOWA"?

By mid-month a number of radio and television stations will have presented a series of programs entitled "Challenge to Iowa."

Local discussion groups formed in many counties (1) to watch or hear the series, (2) to discuss the information presented, (3) to express their opinions on the changes taking place and their relative importance and (4) to discuss what might be done in overcoming the problems they believed important.

Those responsible for the television and radio "Challenge" series would appreciate your individual reaction to the programs—especially if you were not a member of a locally organized discussion group.

If you watched or heard the series, your comments and reactions will be helpful and appreciated. Address: "Challenge to Iowa", Morrill Hall, Iowa State College, Ames, Iowa.

Sliding Scale Leases

For renters and landowners operating under the sliding scale or flexible lease published by Iowa State College, the index for the 1957-58 lease year is 242.5. This is the average index of farm prices received for the 11-month period, March 1957 through January 1958.

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What's Happening to farm size?

Changing methods of farming have brought with them a trend for increased farm size. But the trend has been gradual. And it shows no signs of endangering the traditional base of Iowa family farms.

by Earl O. Heady

MORE THAN a million people left the farm in the United States last year. Announcement of this fact by the Bureau of the Census brought forth expressions of alarm from various sources that the family farm is in danger.

Factual evidence, however, indicates that the family farm is *not* necessarily in danger and, in general, is in a relatively strong position. At the time of the last census (1954), so-called corporation farms made up only 0.2 percent of Iowa's farms. And this proportion has been steadily declining.

The pushes and pulls influencing some people to leave the farm don't all stem from agriculture itself. They stem from the state of our national economy and the relation of agriculture to it—as well as from within agriculture. Most of the people who have left the farm did so because they thought there were better opportunities (income or otherwise) elsewhere than on the particular farm they were farming.

Thus, *some* opportunities for *some* farm families must have looked better than those on the particular farm they were on. Otherwise, they wouldn't have left. But this hasn't been a "mass movement" in which someone said, "One, two, three, GO!" In most cases, each has been an individual decision. And it doesn't mean that agriculture or family farming is a sinking ship. It does mean that total manpower in agriculture is declining and that individual farms are getting larger.

Now, let's look more specifically at what has been happening to Iowa farm sizes and the meaning of the change.

The Quarter Section . . .

The Pre-emption and Homestead acts of the mid-1800's were the tools that helped cut the wilderness which once was Iowa into its farming industry. These acts generally established the quarter-section farm which has long been the most typical farm size in the state. Farms of 160 acres were of "good size" for the farming techniques and capital of 100 years ago. And they remained of "good size" as long as horses and mules furnished most of the power for farming operations.

Even when farming became highly mechanized in Iowa, 160 acres has remained the most typical farm size in the state. But the number of farms of this size or smaller now is declining, and there has been a gradual, but not startling, increase in the number of larger farms. Table 1 summarizes the statistics on this.

For the state as a whole, the change has been quite gradual over the last 35 years, though the number of farms over 49 acres has dropped more rapidly in the past 5 years than in any earlier 10-year period. In Iowa only a few commercial farms are smaller than 49 acres. Percentagewise, the decline has been quite even for sizes under 170 acres over the state as a whole.

Just as the rate of change stepped

TABLE 1. Changes in numbers of farms by size, Iowa, 1920-54.

Size of farm (acres)	Number of farms by years				
	1920	1930	1940	1950	1954
10-49	18,416	18,231	18,197	16,515	14,402
50-99	35,959	32,209	32,146	25,894	22,582
100-179	85,549[1]	84,722[1]	83,821	77,566	70,809
180-259	41,414[2]	42,615[2]	40,024	42,353	42,809
260-499	23,865	22,546	26,119	28,144	29,960
500 and over	2,014	2,136	2,583	3,089	3,555
Total over 9 acres	207,217	205,459	202,890	193,570	183,795
Total over 49 acres	188,801	187,228	184,693	177,055	169,393

[1] 100-174
[2] 175-259

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TABLE 2. Percent decline in number of farms by farming area of Iowa.

Area	Percent change 1920-54 over 9 acres	Percent change 1920-54 over 49 acres	Percent change 1940-54 over 9 acres	Percent change 1940-54 over 49 acres
Northeast dairy	— 7.0	— 5.8	— 7.0	— 6.0
North-central grain	— 6.2	— 6.0	— 6.9	— 5.6
Western livestock	—10.3	—10.1	— 8.8	— 8.5
Eastern livestock	—12.9	—11.3	— 9.9	— 8.6
Southern pasture	—19.9	—18.4	—14.7	—13.1
TOTAL	—11.3	—10.3	— 9.4	— 8.3

up in the 5 years up to 1955, it's likely to increase even more in the next 5 years. It has been especially rapid since 1955 because of the drouth, the drop in farm income and the relatively higher incomes offered by jobs in industry.

Change Not Uniform

The change in farm numbers and sizes hasn't been even over the state (see table 2). Change has been greatest in southern Iowa—where average income per farm has been lowest and where drouths have been most severe. It has been least in north-central Iowa where farms were already larger and in northeastern Iowa where dairying, climate and related factors have given more stable incomes.

There have also been differences among counties (see map)—depending on size of farm relative to soil productivity, income per farm, other job opportunities and birth-rates. The number of farms in Fremont County declined by nearly 25 percent in the 15-year period, 1940-54. At the other extreme, the decline was less than 2 percent in Kossuth County. Farms here have long averaged larger in size, the soils are more productive and the distance to industrial employment is greater than in Fremont County.

Generally the numbers of farms have declined most in soil areas where yields have been lowest. In these areas, too, most of the original farms established were of 160 acres—even though a smaller proportion of the land could be cropped and yields per acre were lower than in other areas. But it's obvious that a farm with relatively poor soil won't produce as much income as one of the same size with a more productive soil.

Many quarter-section farms have persisted in southern and western Iowa. But income differences have become greater with the development of modern farm technology. It's estimated, for example, that roughly twice as many acres per farm on Shelby-Lindley-Sharpsburg soils are required to produce the same income produced on Clarion-Webster or Tama-Muscatine soils.

The pattern of change indicated in the map results generally from these differences in soils and productivity and in nonfarm job opportunities. That is, the decline in numbers of farms also decreases from south to north as industrial job opportunities get farther away.

Three Main Forces . . .

Three types of forces are at work in bringing about these adjustments in farm size:

One goes back to the original settlement of the state when farms of the same size were established on soils which weren't equal in per-acre productivity and income potential. There has been a long general trend in correcting this historical difference. Since 1920 or earlier the decline in farm numbers has been greatest in counties with the less productive soils.

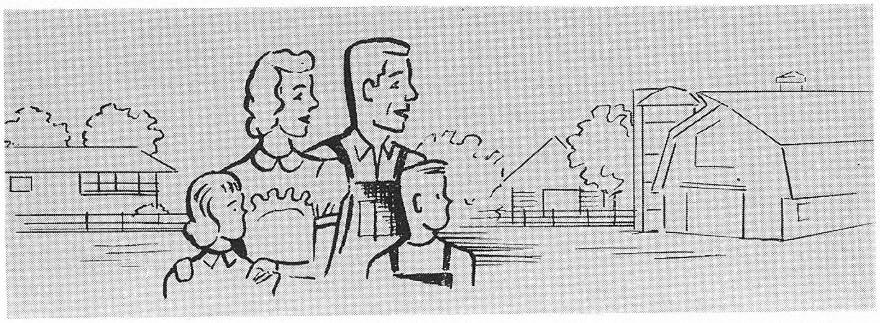
Two other forces, however, have more recently tended to overshadow this first force. One acts as a force to *push* people out of agriculture and to make farms larger. The other tends to *pull* people out of farming and also to make farms larger.

The pushing force is that of new technology which lowers costs for larger farming operations and allows one family to operate more acres. Our studies show that, for typical farm machines, costs per acre decline quite rapidly up to about 240 crop acres. Hence, there's pressure for farm operators with sufficient capital to increase their acreage. This helps to lower costs and increase net income per acre and also to obtain greater total income for family living.

As these operators enlarge their units, they tend to bid higher prices for the land than can be paid by smaller operators. Sometimes field renting is used to enlarge acreage. The operator with a farmstead on his original farm may be able to rent additional land without keeping up another set of buildings. But the general force of either buying or renting added land causes some farms to disappear as separate units and, thus, *pushes* some people from farming.

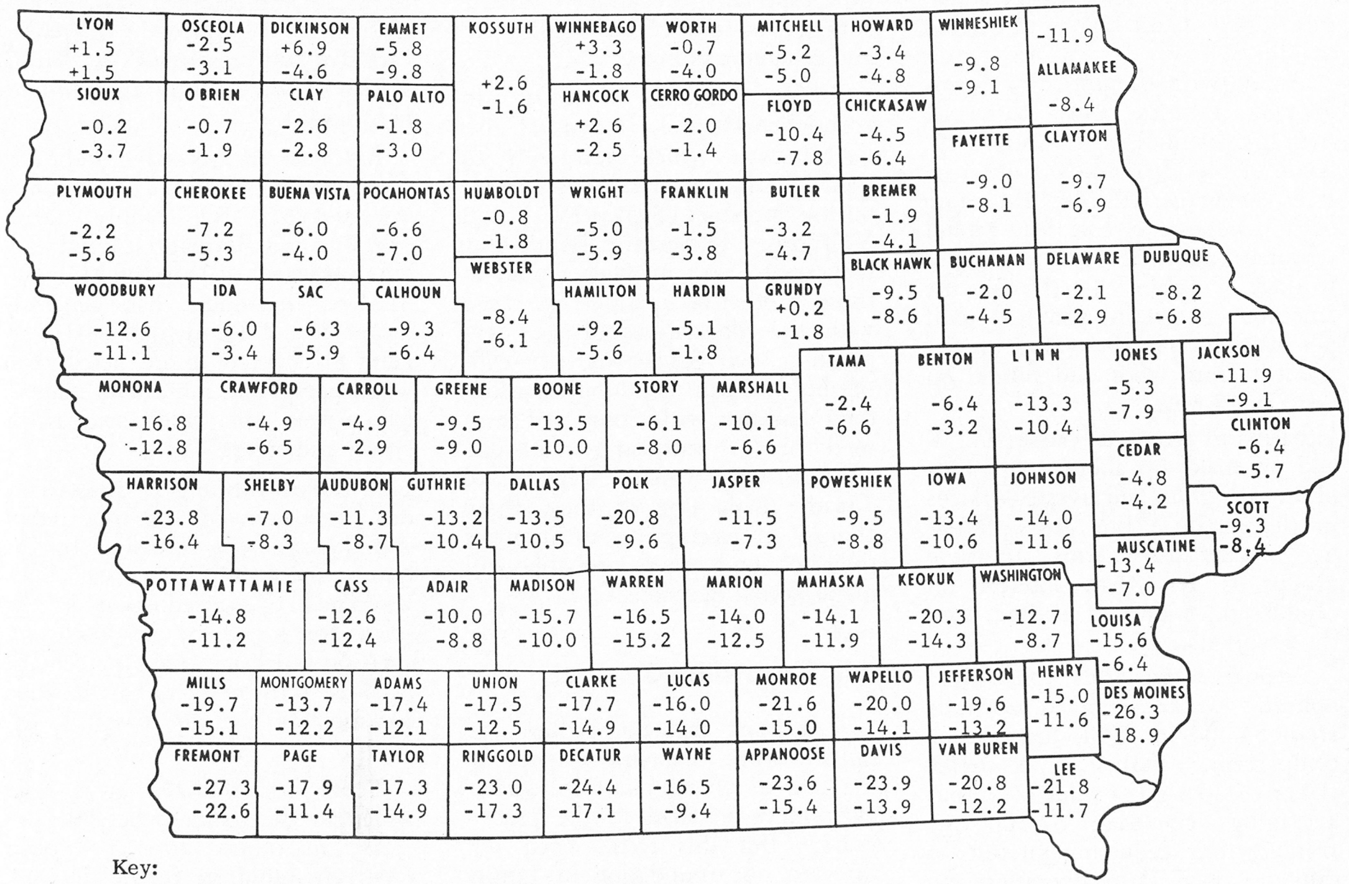
The pulling force is that of general economic growth and growth in nonfarm employment opportunities. Many farm families have recognized that, depending on their own situation, they could have a higher income and standard of living by moving to a nonfarm job. This is particularly true for families short on capital or otherwise unable to expand the acreage operated.

Full employment and high wage rates in nonfarm industries provided an incentive for changing occupations even during the 1940-50 period when farm income was



Average farm size in Iowa is increasing. But it appears that family farming is by no means on the way "out" in the Midwest.

CHANGE IN FARM NUMBERS (Over 49 Acres) IN IOWA COUNTIES, 1920-54 and 1940-54.



Key:
First figure in each county is percent change, 1920-54.
Second figure in each county is percent change, 1940-54.

good. During this time, more people left agriculture and more farms were consolidated in those counties where income per farm has always been lowest. Here, the *pulling* power of favorable nonfarm opportunities was greatest; more people moved from farms, farm numbers dropped faster and size rose more rapidly than in areas with a higher average income per farm.

The attraction of nonfarm jobs also is causing more people to leave agriculture and more farms to become larger near the larger cities with more industry. People tend to shift employment more rapidly and easily when other favorable employment opportunities are close at hand.

What's Ahead?

We mentioned that we believe the trend to fewer and larger farms will continue. But we doubt if the pace will be revolutionary or startling in total, though it may pick up over the next few years—particularly if nonfarm jobs continue to return more income than farming for families unable to expand the size of their farming operation. And these are exactly the prospects for the immediate years ahead.

While the 160-acre unit may remain the typical size over the next 10 years or so, there'll be pressure for relatively more farms of larger size.

Family Farm Not "Out"

These changes in farm size, however, need not peril the family operated farm. Farms of 240 acres and larger in Iowa now are usually managed and operated by farm families. And we believe that this will continue to be the case. While current farm techniques give some cost savings up to about 240 crop acres, the cost structure is not generally favorable for "corporation" or other "mammoth" farms. Most of the cost economies are realized at about 240 crop acres. And a 560-acre farm, for example—which would have to duplicate the machines of a 240-acre unit—would make little or no more profit per acre than a 240-acre farm.

So there seems to be no general threat to the family farm in Iowa as average farm size increases. Actually, these trends could strengthen family farming in Iowa to the extent that farms of efficient size, rather than very large or very small units are created. The sizes of farms which are coming into being allow more adequate returns on capital and labor to provide more income and better living for the farm families who manage and operate them.

"Acres" Only Part

Iowa, like the rest of the Corn Belt, has many farms without a large enough volume of business to provide favorable incomes for the families who operate them. It has a number of small farms which return next to nothing on the farm family's labor. This general picture for the Corn Belt is illustrated in table 3.

An important number of farms provide incomes below those of nonfarm families in the Corn Belt. Some of this difference is due to a lack of managerial skills. But more of it is because of too little capital resources used per farm and per worker. Table 3 shows the amounts of certain resources used per worker and the value of the product from labor and capital on Corn Belt farms.

Farms in economic classes IV, V and VI make up about 40 percent of all cash-grain and livestock farms in the region. But gross output per worker for farms in these groups is less than interest on capital and wages of skilled nonfarm workers.

Annual wage rates for skilled nonfarm workers ranged upwards from $4,000 in 1954, the year of comparison. Farms in economic class IV had a gross value of output averaging less than $2,500 per worker, after deducting interest on capital. And farm operating expenses must be deducted to figure the net income available for family living. The majority of the operators of farms in economic classes IV, V and VI receive little or no return on their labor. These operators, especially, are under the pressure of a competitive agriculture and economic growth.

Some operators of farms in economic classes I, II and III also have incomes which return little to their labor. But pressure is greatest on the operators of class IV, V and VI farms. These farm families, if they are to have incomes similar to those in other occupations, are faced with the alternatives of (1) expanding their operations, (2) continuing to farm and supplementing their income with some off-farm work or (3) moving to full-time nonfarm employment. Many have already made one of these three choices in attempting to improve their lot, and others probably will make similar decisions.

All Considered . . .

It appears that the pushes and pulls at work may tend to speed up the rate of change in farm size—even more so than in the past 5 years. But this trend need not threaten our foundation of family farming. And the types of changes that are and have been going on need not undermine this foundation.

These changes generally will tend to strengthen the position of family farms for the families who remain. Unless it can provide favorable earnings on resources, a strong system of family farming is unlikely to persist.

Research studies have indicated that favorable earnings on resources are possible for family farms operated with enough capital and on a sufficient scale in the Midwest. Modern machinery has generally meant that a family has sufficient labor to operate more acres than when horses and mules and manual labor were the chief sources of power and effort.

If family farming is denoted by the proportion of the total labor and management furnished by the family, the family farm hasn't been weakened by a reduction in the labor force and by gradually increasing farm size. The percentage of hired farm workers has declined considerably over the past two decades.

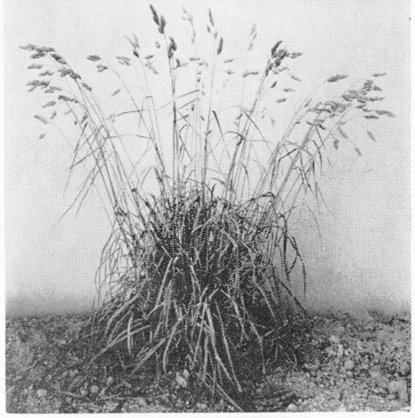
There are localized areas elsewhere in the nation where the increase in other farms has been relatively rapid in recent decades. But this doesn't seem to be in the cards for current commercial agriculture in the Midwest. Nor is it the necessary result of farm size adjustment in Iowa and the Corn Belt.

TABLE 3. Value of resources used per man-year of labor and value of product per unit of labor and capital by type and economic class of farm in Corn Belt, 1954.[1]

Economic class of farm and value of products sold	Amount of land per man-equivalent of labor (acres)	Capital per man-equivalent of labor ($)	Gross value of output per man-equivalent of labor ($)	Value of output per $1,000 of capital ($)	Gross value of output per man-equivalent after deducting interest on capital[2] ($)
	Cash-Grain Farms				
I $25,000 or more	261	72,132	14,475	201	10,862
II $10,000-$24,999	224	56,621	9,889	175	7,059
III $5,000-$9,999	193	39,132	6,139	157	4,182
IV $2,500-$4,999	169	29,321	3,897	133	2,430
V $1,200-$2,499	148	23,924	2,509	105	1,313
VI $250-$1,199	101	14,327	970	68	254
	Livestock Farms				
I $25,000 or more	211	54,168	21,201	391	18,493
II $10,000-$24,999	194	45,426	10,250	226	7,979
III $5,000-$9,999	178	33,452	5,755	172	4,082
IV $2,500-$4,999	163	25,787	3,462	134	2,213
V $1,200-$2,499	150	21,494	2,226	104	1,151
VI $250-$1,199	111	13,645	937	69	254
ALL COMMERCIAL FARMS	171	35,217	6,870	195	5,114

[1]Source: 1954 Census of Agriculture, Special Report: Cash-Grain and Livestock Producers in the Corn Belt. U.S. Department of Agriculture and U.S. Department of Commerce. Washington. 1956.

[2]Interest at 5 percent on capital shown in column 2 subtracted from product per worker in column 3.



Orchardgrass—

Its Use on Iowa Farms

by J. M. Scholl, R. R. Kalton and H. E. Thompson

THE TRUE value of orchardgrass has only recently been realized in the north-central states. Experiment stations in this area are now, however, aware of its possibilities and are conducting extensive studies on use, management and improvement. Results have shown many features which place orchardgrass among the best grasses now available. Some of these features are:

- A perennial that is well adapted to soils and climate of the area.
- Superiority over most grasses in recovery after grazing or mowing; persists well in pastures under good management.
- Earliness, followed by favorable distribution of aftermath growth.
- Vigorous growth that helps maintain a good grass-legume balance—important in the control of pasture bloat.
- Stands that are easier to establish than many grasses because of the vigor of the seedlings.
- Relatively good tolerance to drouth and high temperatures.
- High nutritive value and palatability when properly managed.

Here's some information on the characteristics, culture and management of orchardgrass and its usefulness for Iowa.

What It Is: Orchardgrass is a perennial bunch-type grass, brought into this country from Europe in colonial times. It's one of our earliest grasses, frequently heading the first week in May in southern Iowa and by late May in northern counties. Heads are short and branched and open out at flowering, giving a "cocksfoot" appearance—the common European name for orchardgrass. Heads ripen rapidly after flowering, with seed maturing somewhat ahead of bromegrass and 2-3 weeks ahead of timothy. The seed is intermediate in size between bromegrass and bluegrass. Good seed germinates rapidly, producing vigorous seedlings which compete well with weeds and other forage crops.

The rapid, early growth and early heading account for the low palatability rating often given to this grass. When it is allowed to set seed, it becomes coarse and stemmy, semidormant and of low feeding value for the rest of the season. But forage of satisfactory palatability and feeding value can be produced by removing seed heads soon after they emerge and by keeping the plants in good grazing condition the rest of the season.

Orchardgrass for pasture has a distinct advantage over other grasses because of its ability to produce during the summer months. Most of our common grasses, notably bromegrass, produce most of their growth during the spring and contribute very little during the rest of the summer. Orchardgrass, on the other hand, continues to supply forage later in the season. This is important when grass-legume mixtures are grazed, since control of bloat appears to be related in some way to the balance between the amount of grass and legume. Bloating is more prevalent and severe on pastures high in legumes. Using orchardgrass in grass-legume mixtures that are to be grazed offers some help with this problem.

Adaptation: Orchardgrass is grown in most states to some extent but is most important in the eastern part of the United States north of Alabama and Georgia. Use is increasing in the western Corn Belt states and in irrigated pastures in the West. Though not as winter-hardy as brome or timothy, it will thrive under higher temperatures and more humid conditions. Well established plants or seedlings normally withstand the winters of the central states. But if plants are weakened by poor management, winterkilling may occur.

Orchardgrass grows well on light soils of medium fertility and on moist, heavy soils. It's more shade tolerant and somewhat more acid-

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soil tolerant than most forage grasses.

Iowa Performance: Many trial plantings have been made in Iowa to compare orchardgrass with other common grasses both alone and in mixtures with pasture legumes. Comparisons have been made over a period of 4 years or longer and on soils representative of a large part of the state. Dry matter production was as good as any of the grasses when they were harvested frequently to simulate rotational grazing management. But orchardgrass had a marked advantage over other grasses in the distribution of growth through the season.

A comparison of orchardgrass and bromegrass in yield and distribution of growth is shown in table 1. Though the information in the table shows that mixtures of alfalfa and orchardgrass produced about the same as alfalfa and bromegrass, the alfalfa-orchardgrass mixture contained more grass. Advantages in both total growth and distribution of growth can provide added insurance against bloat losses.

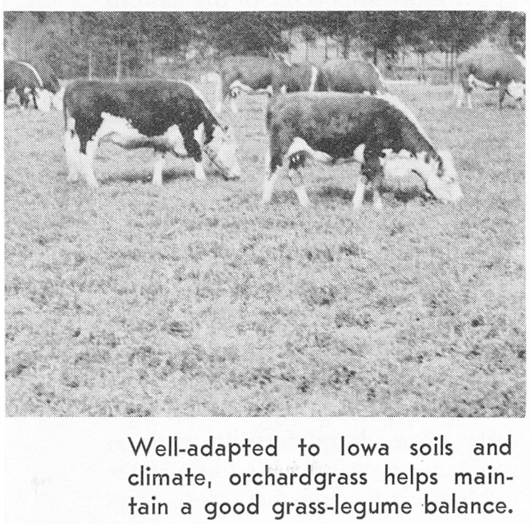
TABLE 1. Comparison of orchardgrass and bromegrass grown with alfalfa at three Iowa locations.

	Mixtures	
Performance	Orchard-grass-alfalfa	Brome-grass-alfalfa
Av. annual yield of dry matter (lbs./A)[1]		
Page Co. (1952-57)	7,479	6,998
Ringgold Co. (1952-56)	5,648	5,912
Howard Co. (1954-57)	4,256	4,824
Av. percentage of grass in the forage (%)[2]		
Page Co.	19	6
Ringgold Co.	31	23
Howard Co.	42	38
Percentage of grass in aftermath growth (%)[3]		
Page Co.	18	4
Ringgold Co.	28	20
Howard Co.	40	32

[1]Yields of weed-free dry matter (dried to constant weight in forage dryer at 135° F.).

[2]Total yields of grass produced in the mixtures during the season based on hand separations.

[3]Includes all except the first harvest.



Well-adapted to Iowa soils and climate, orchardgrass helps maintain a good grass-legume balance.

Varieties: Several varieties and strains of orchardgrass are available commercially. Of these, *Commercial* and *Potomac* appear most suitable for Iowa. Seed of Commercial (or Common), which is produced in the mid-Atlantic states or the southern Corn Belt, is good in all-around performance and is winter-hardy. Potomac yields about the same or somewhat less than Commercial, is as hardy and is somewhat better in leaf disease resistance. Both are mid-early in heading and good in aftermath vigor.

Seed lots classified as *"Danish"* have been variable in performance, and their adaptation to Iowa conditions is still questionable. The mid-late types, *Latar* and *S-37,* are slow in spring recovery and lower in annual yield than the Commercial type. They also are poorer in drouth resistance and winterhardiness. It's doubtful whether they would do well consistently in the state.

Establishing a Stand: Best seeding results are obtained with well-prepared, firm seedbeds. An even distribution and shallow coverage of the seed are important. These can best be obtained with a grain drill, packer-seeder or other similar types of seeders. Seeding should be followed with packing.

Early spring is the most dependable time to seed orchardgrass. Late summer, however, is satisfactory in seasons with favorable moisture.

Orchardgrass for forage is almost always grown with one or more legumes. Since orchardgrass seed is considerably smaller than bromegrass and the seedlings are vigorous, seeding rates for orchardgrass can be relatively low. Table 2 gives some common seeding rates and mixtures.

On sloping land, when the seedings are to be left for several years, it's desirable to include some bromegrass since bromegrass is sod-

TABLE 2. Common orchardgrass seeding rates and mixtures.

	Seeding rates (lbs./A)	
	Legume	Orchard-grass
Alfalfa	6-8	3-5
Ladino clover	1-2	3-5
Red clover	6-8	3-5
Birdsfoot trefoil	4-5	2-3

forming and better than orchardgrass for holding soil against erosion. A mixture of alfalfa (6-8 pounds per acre), bromegrass (5 pounds) and orchardgrass (3 pounds) meets these requirements.

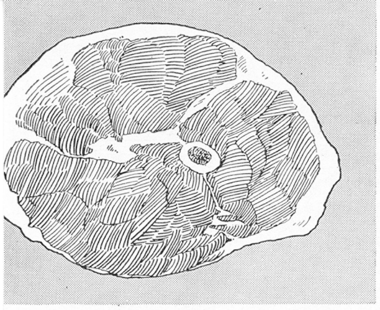
With adequate moisture and fertility, orchardgrass seeded alone and without a small grain companion crop has produced a heavy crop of forage the year of seeding. This growth can be used for silage or pasture and will usually be of high quality, with few seed heads forming the first year.

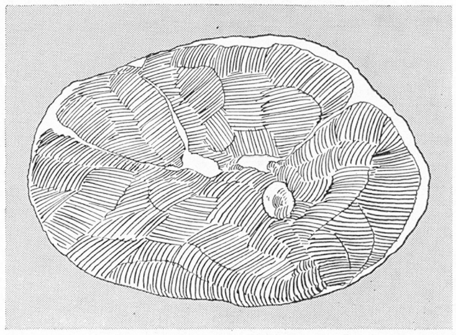
Orchardgrass has acquired a reputation for good establishment and growth on extremely poor soils. While this may be true, adequate fertility is necessary for satisfactory production. The best way to determine the needs of a field is to have the soil tested and then to fertilize accordingly. Pure grass stands will require annual applications of nitrogen to keep up production. As with other crops, balanced fertility is important.

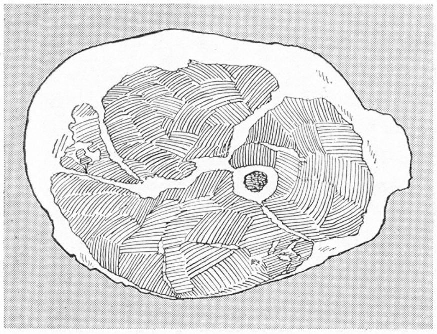
Use and Management: Orchardgrass is primarily a pasture grass, but is satisfactory for hay or silage if properly managed. Because of its early vigor, the early growth must be removed to prevent seed formation—usually before other crops in the mixture have reached hay stage. This growth makes excellent feed if harvested soon after the heads emerge. And this early cutting will improve the quality of growth throughout the summer. Management after this first harvest should favor good legume growth.

Regular mowing of pastures is advisable to reduce the effects of uneven grazing and to control weeds.

Close grazing during the late growing season and in early spring should be avoided for best growth. Overgrazing and close continuous grazing early and late in the season will reduce stands.







What Kind of Ham Do People Want?

by R. O. Gaarder and E. A. Kline

IN THE December 1956 issue of IOWA FARM SCIENCE, we reported some sales tests of pork chops. In that study we found that the carcass grade of the hog didn't seem to matter to the shopper when she bought pork chops. It was the *size* of the lean part of the chops that counted. What about other pork cuts? For ham, at least, the story is different.

Grades of hog carcasses are based largely on backfat thickness—the thicker the backfat, the lower the grade, other things being equal. The U.S. No. 1 carcass has the minimum finish required to produce high-quality pork cuts. No. 2 carcasses are slightly fatter than necessary, and No. 3 carcasses are decidedly overfat.

The retail sales tests of pork chops indicated that shoppers were interested in large, meaty chops. No. 1 carcasses tend to have larger loin eye (chop) muscles than No. 3 carcasses. But some No. 3 carcasses have fairly large chop muscles, and some No. 1 hogs have fairly small loin muscling. So the loins had to be sorted by muscle size rather than by hog carcass grade before shoppers would discriminate between the center-cut pork chops from No. 1 and No. 3 hogs.

This article reports a test in which half hams and center slices of ham were sold. Three grocery stores—one in Waterloo, one in Cedar Rapids and one in Davenport—cooperated in these tests.

Carcasses were graded at the packing plant. Hams from No. 1 and No. 3 hog carcasses were sent to one of the three stores each weekend for 6 weekends. Altogether 120 hams were sent to each store on two different weekends.

Half Ham Sizes . . .

Records were kept on the sale of over 1,300 pounds of half hams. In the grocery store an "island" type refrigerated display case was used for selling the half hams. The case was divided in the middle; hams from No. 1 hogs were placed in one half and hams from No. 3 hogs in the other. As pieces were sold they were replaced so that the displays were similar in appearance. The locations of grade 1 and grade 3 were switched to give both grades a chance at both sides of the case. Hams from both grades were sold at the same price per pound. There were no indications that one display contained a different quality than the other.

In every weekend test, the half hams from No. 1 hogs outsold the half hams from No. 3 hogs. Statisticians tell us that, considering the consistency of our results and the amount of the difference each time, the odds against this happening only through chance are higher than 99 to 1. So we're pretty sure we would get similar results if we tried the test again. For every \$100 of sales of half hams, an average of \$63.50 worth was sold from the grade 1 bin and \$36.50 from the grade 3 bin.

This doesn't, of course, mean that we could double sales by making all hogs grade 1. It does indicate that in three different communities in Iowa, people prefer hams from leaner hogs if given a choice at the same price. Perhaps there are differences between communities, but it would require further research to know the extent of these community differences in the pork preferences of consumers. Also, the tests so far give no idea as to what price differentials, if any, consumers would be willing to pay for lean pork.

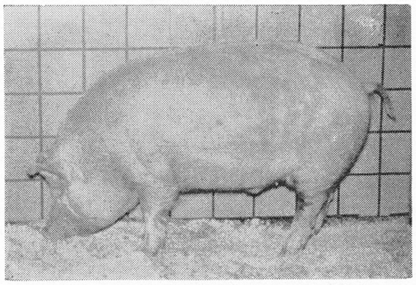
Center Slices . . .

We kept records on the sale of 90 pounds of center ham slices. Ham slices from No. 1 and No. 3 hog

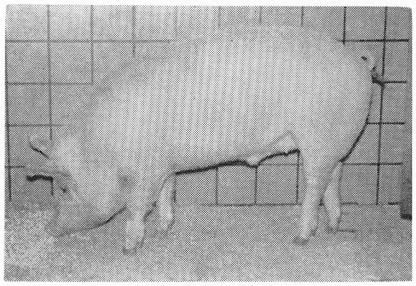
R. O. GAARDER was formerly an associate in agricultural economics, and E. A. KLINE is associate professor of animal husbandry.

TABLE 1. Average slaughter data on 60 U.S. No. 1 hogs and 60 U.S. No. 3 hogs.

	Average liveweight	Average rough ham weight (two hams)	Average ham weight after trimming and curing
	(pounds)	(pounds per hog)	(pounds per hog)
U.S. No. 1	206.9	36.5	29.4
U.S. No. 3	221.1	36.8	27.2



A Fat-Type Hog
(U.S. No. 3)



A Meat-Type Hog
(U.S. No. 1)

carcasses were sold side by side in two rows in a regular self-service meat display case. Slices from both grades were sold at the same price per pound. The slices were individually wrapped and weighed from 8 to 12 ounces.

Sales of center slices were tested in only four of the six weekend tests. In each of the four tests, the center slices from No. 1 hogs outsold the slices from No. 3 hogs. Considering the consistency of our results and the amount of difference in sales in each test, the odds of this happening only through chance are about 10 to 1. Consequently, we're not certain that the slices from No. 1 hogs would have consistently outsold the slices from No. 3 hogs if there had been more tests. For every $100 of sales of ham slices, an average of $60 worth was sold from the grade 1 row and $40 worth from the grade 3 row. Our "odds" are not as great here as they were for half hams, either because there isn't as much difference in preference or because we didn't sell enough center slices of either grade to measure preference accurately.

At the Packing Plant . . .

More fat had to be trimmed from the No. 3 hams than from No. 1 hams at the packing plant. Table 1 gives a brief summary of how the hams cut out for the first 120 hogs butchered. Notice that the No. 1 hogs were lighter, yet produced heavier hams after trimming. The butchers at the packing plant were told to try to give each ham a uniform trim.

Quality Differences . . .

It is well known that No. 3 hogs have more external ham fat than No. 1 hogs, but this fat can be trimmed to some extent. To see if there is really a difference between trimmed, center-cut ham slices in the amount of observable fat, we measured fat and lean areas on the surface of some of the slices. The pockets of fat inside the hams from No. 1 hogs were smaller, on the average, than those in the No. 3 hams. And there was more external fat on the No. 3 hams and slices that didn't get trimmed off by the packer or by the grocer.

Table 2 compares the hogs that produced the hams drawn by title (fat-type, left, trimmed and untrimmed; meat-type, right) with other No. 1 and No. 3 hogs.

The Meaning . . .

In these tests the meat-type hog produced a ham that sold faster even after some of the external fat was trimmed from both types of hams. Even after trimming, there was more observable fat on ham slices from No. 3 carcasses than on slices from No. 1 carcasses. We don't know, however, what the results would be if the leaner hams were sold at a higher price per pound than hams from the fat-type hogs.

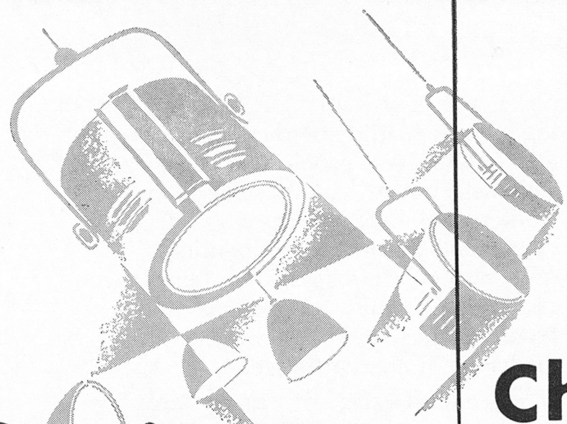
At the packing plant, the trimming and curing loss on the hams from the No. 1 hogs was about 2.5 pounds less per hog than the loss from No. 3 hogs.

As far as results from this one study show with respect to hams, the No. 1 hog seems to have the characteristics desired (1) by packers for high yield of lean cuts, (2) by retailers for high yields from wholesale cuts and (3) by consumers for lean meat for the table. But this study and the preceding one included just half hams, center slices and center-cut chops; we need further research to include other pork cuts and the carcass as a whole.

TABLE 2. Comparison of a meat-type hog and a fat-type hog with other U.S. No. 1 and U.S. No. 3 hogs.

	Meat-type hog	Fat-type hog	Average of 15 U.S. No. 1 hogs killed same day	Average of 15 U.S. No. 3 hogs killed same day
Liveweight	205.0 lb.	205.0 lb.	205.7 lb.	220.7 lb.
Rough ham weight	17.8 lb.	17.2 lb.	17.9 lb	18.0 lb.
Ham weight after trimming and curing	14.7 lb.	12.8 lb	14.1 lb.	13.5 lb.
Trimming and curing loss per ham at packing plant	3.1 lb.	4.4 lb.	3.8 lb.	4.5 lb.
Weight of fat trimmed at grocery store[1]	1.5 oz.	7.5 oz.	1.6 oz.	4.8 oz.
Retail selling value of ham center slices (2 slices per ham)	$1.64	$1.33	$1.56	$1.37

[1]The half hams had a little fat trimmed from the corners of the cut edge, and the fatter slices had to have fat trimmed from them.



Spotlighting Church-Community Programs

Cooperation between churches and the community is one way of getting worthwhile projects accomplished. This is especially important today when our rural communities are changing in many ways.

by W. H. Stacy

WE'VE BEEN hearing a lot lately about the changing nature of agriculture in Iowa, about the effects these changes are creating in our farm businesses, our homes and our communities, and about the further effects we see upcoming in the future. Changing methods in agriculture are calling for changes in the community and in the community services offered.

Also, community programs for better living and changes in community services bear upon agricultural adjustment. New job opportunities, better means of communication, education to meet new problems, additional personal and family satisfactions are all products of community action.

Churches are involved both ways—adjusting to change and creating changes. Their effectiveness varies. Much depends upon church-community relationships. To "spotlight" this type of development, the Cooperative Extension Service working with church leaders and the Iowa Christian Rural Fellowship, has presented annual merit awards directing attention to "Rural Community Service Programs of Churches."

Purpose of Awards . . .

The purpose of these awards is ". . . to recognize and encourage the development of vital religious programs that have a bearing upon leadership service and cooperative endeavors which contribute to better living in Iowa communities."

In the 28 years the recognitions have been offered, a total of 1,442 merit awards have been presented to 547 different Iowa churches representing 15 different denominations (up to Jan. 1, 1958). All but one Iowa county is represented by these 547 award-winning churches.

The first church so recognized was St. Mary's Catholic Church at Panama. Second was the South Waterloo Church of the Brethren in Orange Township of Black Hawk County. It has since received 25 additional awards of this type.

Basis of Judging . . .

The report forms, upon which judging of the programs is based, are supplied by the Extension Service. The forms are available through county extension offices and from Ames. Each report focuses attention on what is done during a calendar year—though this may be part of an on-going, long-time program.

The form in current use, a 6-page printed guide, emphasizes essential points in developing church-community relationships. It calls for information which:

1. Identifies the church, its community area and its principal leaders,

2. Reports the size of the church constituency,

3. States the plans for the year,

4. Lists projects undertaken and results achieved, with emphasis on the "outstanding project of the year,"

5. Reports short-time and long-range goals,

6. Indicates methods used in developing programs,

7. Identifies community leadership responsibilities carried by church members,

8. Reports special church services related to rural and community life,

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W. H. STACY is associate professor of rural sociology.

9. Mentions youth programs, other than church programs, in which young people are participating and

10. Outlines four aspects of the religious programs developed by the church.

This last point recognizes that churches do their basic work in the religious field. While the rural community program awards feature church and community relationships, it is recognized that the major achievements of churches are in the area of their primary responsibilities. Here standards vary with the religious organization of which the church is a part. But there are certain common endeavors, and a church must be effective in developing these major functions to qualify for a certificate of merit. Therefore, the forms ask for a brief report of the programs in: religious education, recruiting and training new members, visitations by the pastor and lay members and world service activities.

Major policies for the merit award program are shaped by the board of the Iowa Christian Rural Fellowship which correlates this and other aspects of church and community work in the state. The Fellowship's 21 directors include professional leaders from major religious groups, together with representatives of farmers' organizations, educational institutions and other significant programs related to rural community life. Its president signs the award certificates jointly with the director of the state Extension Service.

State and district church executives, or their rural church workers, make a special point of bringing the awards to the attention of pastors and lay people in local churches. And county extension workers are kept informed of developments and invited to nominate cooperating churches. In some cases, they obtain supplies of the report blanks and place them in the hands of church leaders.

The certificates of merit are presented in a featured session of the Iowa Christian Rural Institute. The Iowa State College Information Service supplies news releases to press, radio and television at the time the awards are made.

Interest Growing . . .

Interest in church-community relationships and the award program has been growing through the years. During the first 5 years of the plan, certificates of merit were presented to 41 different churches located in 32 counties. These numbers have been gradually increasing. In the last 3 years, 1955-57, a total of 164 different churches in 77 counties have reported and qualified.

Some of the award-winning churches report every year. The table shows the number of churches that have reported and qualified for more than a single year. We don't have the names of the pastors for all the churches recognized; quite often the practice of reporting follows the pastor when he moves from one charge to another.

Many churches have framed their certificates; they're placed in church entries as year-around reminders. Some churches have special presentation ceremonies with representatives of the extension service staff participating.

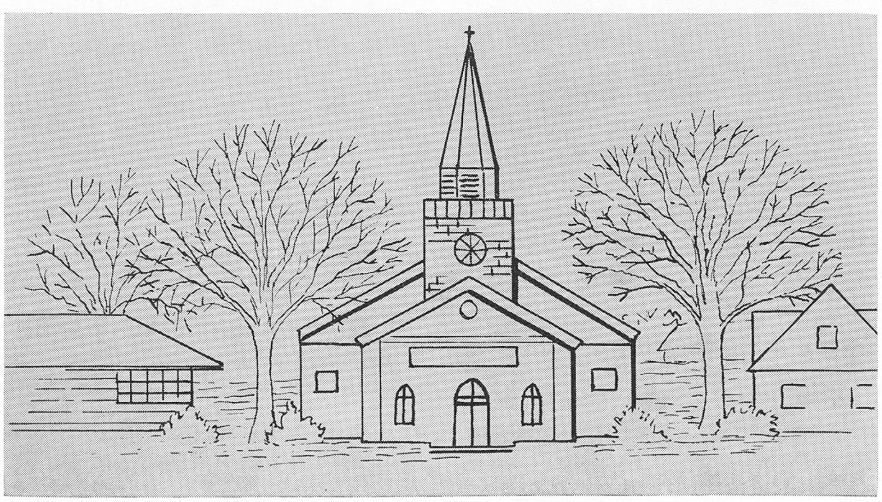


TABLE I. Number of churches receiving certificates of merit for 1 year or more.

No. years	No. churches
1	256
2	127
3	67
4	46
5	32
6	21
7	5
8	6
9	4
10	3
11	1
12	2
13	1
14	1
18	1
26	1

NOTE: Does not include 1957 awards made in 1958.

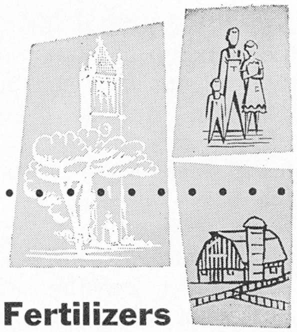
Awards With Distinction

Awards of merit are given each year to all reporting churches which show balanced and significant programs in the area covered by the outline. In addition to these Awards of Merit, the judges select five churches for Awards of Merit With Distinction. These five churches are judged to be most outstanding in the membership groups having (1) less than 76 members, (2) 76-150, (3) 151-300, (4) 301-500 and (5) over 500 members.

Though the award program is set up for rural churches, the word "rural" is broadly interpreted. A number of churches reporting are in the open country. On the other hand, several are in county seat towns with many members whose association with rural life programs are chiefly of a service nature.

Adding It Up . . .

No scientific surveys have been made to evaluate the significance of these annual recognitions. But strengthening of church-community relationships is one way of encouraging greater effort to advance worthwhile endeavors. These annual awards illustrate the progress that can be made by churches in the community to adjust to the changing needs of our modern life.



YOUR EXPERIMENT STATION REPORTS

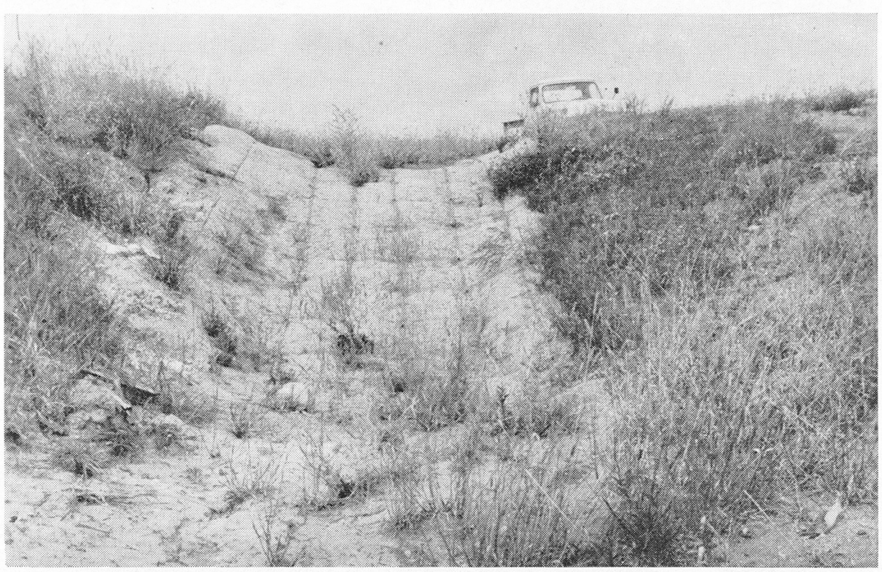
Soil Management and Fertilizers

Compare Oat Yields From Application Of Three P_2O_5 Sources

THREE PHOSPHORUS fertilizers of varying water solubilities were compared in both broadcast and drilled applications for oats in Experiment Station tests conducted by John Webb. The phosphorus sources included (1) dicalcium phosphate, with 2 percent of its phosphorus in a water-soluble form, (2) nitric phosphate, with 40 percent of its phosphorus in a water-soluble form, and (3) concentrated superphosphate, with 86 percent of its phosphorus in a water-soluble form. Each source was applied at rates of 20 and 40 pounds of available P_2O_5 by both methods of application.

Results showed that the source of phosphorus was relatively the more important factor on a calcareous soil, while the method of application was of greater importance on an acid soil. On a calcareous Webster silty clay loam, the increase in yield from the most soluble source averaged about 11 bushels—over twice the increase from the least soluble source. But on an acid Floyd silt loam, this spread was only 1 bushel. Other work has shown that different growing conditions may influence the relative importance of water solubility and placement.

Drilling of the P_2O_5 was superior to broadcasting by 1.4 bushels on the Webster soil and by 3.3 bushels on the Floyd soil. The advantage for drilling tended to be greater with an increase in solubility of the source.



Rock flumes are being tested as possible low-cost gully-control structures. Preliminary tests with flumes using crushed rock within a wire mesh (such as the one at Ankeny in the photo) indicate that stabilizing with cement or asphalt may be necessary.

Construct Low-Cost Gully Control Structures

EXPERIMENTAL rock flumes have been installed at Denison and Ankeny to test their usefulness as low-cost gully control structures. The flume at Denison was placed at the outlet of a 100-acre watershed and drops the runoff water about 10 feet. The cost of material and bulldozer operation was $520. Any labor involved could be done by the farmer. These flumes still have to be tested in operation before positive recommendations can be made, report C. E. Beer and H. P. Johnson of the Experiment Station.

Why Conduct Basic Research on Fertilizers?

THE EFFECTIVE use of fertilizers is measured and determined under field conditions. Many times, however, it's necessary to understand some of the fundamental relationships between crops and their soil environment to properly evaluate the effects observed and measured as changes in yield.

Also, there are interactions among plant nutrients in the soil and in the plants which influence crop yields. These interactions are further affected by climate. The sources of the nutrients are also important both agronomically and economically. Finally the actual use of fertilizers as factors of production is determined by the economic situation as well as by the yield responses obtained under specific soil and crop situations.

For these reasons research workers at the Experiment Station are constantly studying basic relationships in the need for and efficient use of fertilizers on Iowa soils. Some of the recent experiments at the Station have concerned the effect of corn residues on nitrogen availability and recovery, nitrates in crop plants under drouth conditions, sources of phosphorus for growing plants, evaluation of a generalized fertilizer response function, fertilizer placement, corn fertilizer experiments and soybean fertilizer experiments. Some of these experiments will be reported in this section.

John Pesek, L. C. Dumenil, J. R. Webb, H. R. Meldrum, J. Hanway, C. M. Smith, W. H. Pierre and Earl O. Heady are working on these basic problems.

Irrigation Use Increases in Iowa

TWICE AS MANY Iowa farmers used irrigation in 1956 as did in 1955 according to a survey conducted by the Experiment Station. With 10 counties not reporting acreage figures, the total irrigated acreage increase for 1956 was 14,724—giving a total of about 26,000 acres irrigated in Iowa in 1956.

Because of the increased interest in irrigation over the state, studies of responses of corn to irrigation at different stand and fertility levels were made by Experiment Station researchers at Ames and at Marion. According to W. D. Shrader, Howard Johnson, C. E. Beer and Robert Shaw, who conducted the studies, irrigation resulted in the following corn yields at Ames in 1956: no irrigation, 29 bushels per acre; preseason irrigation only, 62 bushels per acre; light irrigation, 107 bushels per acre.

The researchers report little difference in yields between different stand levels but say that irrigation had a tendency to make a larger ear size while the high stand level had a tendency to reduce ear size. Irrigation was also effective in reducing the percentage of barren stalks.

At Marion, rainfall in 1956 was much more favorable than at Ames. In spite of relatively favorable nonirrigated corn yields, however, the average yield for irrigated plots was 21.4 bushels per acre greater than for nonirrigated plots.

The effect of irrigation, stand and fertility levels on date of silking was also studied. Results indicated that additional water had a marked influence in advancing the date of silking and thus the probable date of maturity of corn. Under the extreme drouth conditions of 1956, the date of silking was delayed by either adding nitrogen or increasing the stand on nonirrigated plots. Neither of these treatments had any effect on the irrigated plots.

A soybean irrigation experiment was also conducted at Ames in 1956. Three water levels were studied. One treatment received rainfall only. Another received irrigation water as needed throughout the season, and the third was irrigated only from the time the soybeans started to bloom until the beans started to ripen. Yields were as follows: no irrigation, 21.3 bushels per acre; 9 inches of irrigation, 32.8 bushels per acre; and 14½ inches of irrigation, 36.4 bushels per acre.

Ridge Planting of Corn Saves Power, Water, Soil

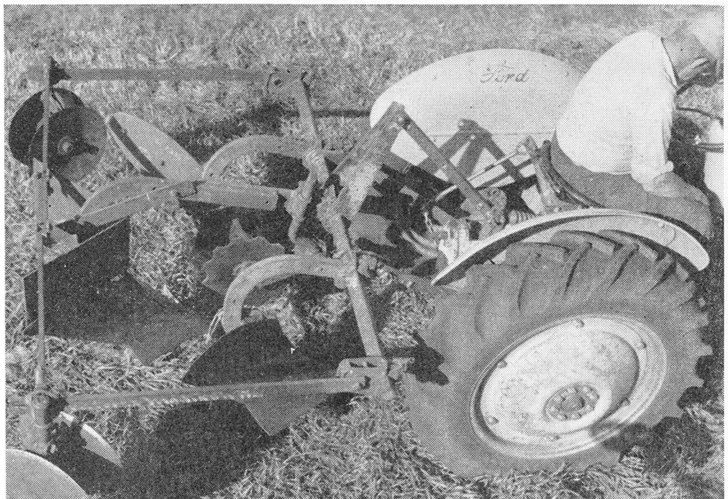
FOR THE PAST several years corn has been successfully grown on the ridges on Iowa farms. This seedbed preparation method reduces power and labor requirements, maintains high yields, and reduces soil and water runoff. It's described in some detail in the June 1955 issue of IOWA FARM SCIENCE and in reprint FS-607.

In 1956 several experiments were conducted to study equipment and methods of constructing ridges and to compare them with other tillage practices.

On a Clarion-Webster soil, methods of constructing ridges were compared with listing, rototilling and conventional (plowing, disking and harrowing). General conclusions from this experiment are: The primary tillage practices of ridging, listing, roto-tilling and conventional produced about the same yield. The extra power requirement of the roto-tillers on ridges that had been constructed with a moldboard plow did not improve yields. Results indicate that it may be necessary to perform this secondary tillage if weed infestation is heavy.

The largest possible saving in power and labor comes on second-year corn. By planting on ridges used the previous year, it's often possible to eliminate all seedbed

In addition to other studies of tillage methods and equipment, researchers at the Experiment Station are also studying equipment and methods of growing corn on wide ridges or beds. The photos show two views of experimental equipment for constructing large ridges or 2-row beds.



preparation. When weeds are a problem, working the ridges before planting is necessary.

Another experiment on a Webster soil was designed to study equipment and methods for working old ridges before planting. Using subsurface tillage sweeps or potato hoes to work the ridges tended to reduce yields somewhat, while all other methods tended to increase yields. Working the ridges before planting killed many weeds and improved the effectiveness of both cultural and chemical weed treatments. Stand counts were not affected by the tillage methods.

Plowed ridges, old ridges worked with disk-hillers, conventional planting and listing also were compared on the Webster soil. Yields were low, however, because of dry conditions. In general, this experiment showed that corn yields can be maintained when untilled or plowed ridges are used.

A small experiment was conducted in Albia on Edina soil to compare conventional surface planting with ridge planting. Results were similar to other experiments and showed that ridge planting as a tillage practice maintains yields as high as those obtained with conventional tillage methods.

In addition to these experiments, researchers continued studies on equipment and methods of growing corn on *wide* ridges or beds. With this practice, it's possible to operate the tractor and equipment on top of the ridge. The arrangement of plows and disks used to construct these wide ridges is shown in the photos.

By using a wide-front-end tractor, the equipment and tractor can straddle the furrow. This means that all the mechanical operations necessary for corn production can be performed with water standing in the furrows. Cultivations and harvesting using this method are still problems that need more experiments and study. However, yields from previous experiments indicate that this practice has a potential usefulness in some areas of Iowa.

Key personnel in these studies of ridge planting are W. G. Lovely, E. V. Collins and W. F. Buchele of the Agricultural Engineering Department.

Wider Terrace Spacing Possible in Western Iowa

LEVEL TERRACES have proven to be effective for erosion control on the deep, permeable loess soils of western Iowa. However, there has always been a need for more information on which to base the design of these terraces. The results of two recent experiments conducted at the Western Iowa Experimental Farm have given new information on this problem.

Level terraces with different vertical spacings were observed from 1949 to 1956. In another experiment, the amounts of water runoff and soil erosion were measured as influenced by two crop rotations and three seedbed preparation methods for corn. On the basis of observations from these studies, it appears that level terraces on these soils may be spaced wider than currently recommended if the corn is contour listed. Also, a rotation with a greater percentage of corn than a corn-oats-meadow-meadow rotation could be used if the corn is contour listed, say W. E. Larson and W. C. Moldenhauer who are key personnel working on this study.

Nitrogen Availability Influenced by Placement Of Crop Residues

RESEARCH at Iowa State College shows that tillage methods that leave low nitrogen crop residues on the soil surface (mulch tillage) often result in lower nitrogen availability to corn than do tillage methods that plow under the residues. This difference in nitrogen availability is apparently related to placement of the residue.

Though this effect is known to happen, we still don't know why it happens. To discover why placement of residue influences nitrogen availability, a number of laboratory, greenhouse and field experiments are being conducted under the direction of D. T. Parker and W. E. Larson. Results to date are still preliminary, and further study is needed on this problem.

Soil Samples Are Guides To Good Soil Management

EACH YEAR thousands of Iowa farmers take advantage of the soil testing facilities at Iowa State College. During 1956 the Soil Testing Laboratory tested 55,514 individual soil samples. And this number is below the average for other years because of the drouth in many areas of the state in 1956, says John J. Hanway.

Testing your soil is an important part of good soil management. An accurate soil test can tell you much about your soils' nutrient needs and leads to reliable fertilizer recommendations. For more information about the benefits from soil tests and how to have your soils sampled, see the August and September 1956 issues of IOWA FARM SCIENCE or contact your county extension director.

In addition to testing the soil samples sent in by farmers over the state, workers at the Experiment Station are constantly seeking to improve the reliability of the testing methods used by the Soil Testing Laboratory. One example of this work is a study that has been started to learn the variation that might occur in soil test results from samples collected at different times of the year.

In this study, samples are periodically collected from fields in different areas of the state. At each location, samples are collected from plots on which different crops are being grown. Preliminary results indicate only minor variations in soil test results due to time of sampling. This study will be continued for a number of years to study the effect of different seasons.

Rainfall Distribution Important in Corn Study

THE IMPORTANCE of rainfall distribution in determining the relative yield of first- and second-year corn (the first corn crop following a meadow is referred to as first-year corn and the second corn crop as second-year corn) was shown in 1956 results of a long-term study by the Experiment Station.

From 1950 to 1956, first-year corn yields have averaged 13.8 bushels higher than second-year corn on four of the oldest rotation experiments. These four experiments have all been running for 10 or more years. In spite of this long-time trend, second-year corn has outyielded first-year at individual sites in some years. This reversal was especially noticeable in 1956.

The appearance of the corn in September 1956 on Carrington-Clyde soils indicated clearly that there was a difference in the amount of moisture available to first- and second-year corn. First-year corn appeared to be much more severely damaged by dry weather than did second-year corn.

In another experiment on the Carrington-Clyde field, corn following alfalfa was much shorter of moisture than was corn following red clover. This indicates that the moisture difference was in the deep subsoil below the reach of red clover roots but within reach of alfalfa and corn roots. All yields were relatively high, but yields of first-year corn were some 20 to 30 bushels per acre below second-year yields.

Corn yields in 1956 at the Pasture Improvement Farm at Albia and at the Soil Conservation Farm in Page County showed some idea of the importance of rainfall distribution. At both of these sites, growing season rainfall was lower than at the Carrington-Clyde Farm. In both cases, however, second-year corn yields were below first-year yields—perhaps because deep subsoil moisture was completely exhausted in all cases and crop growth depended largely on current rainfall.

At Ames, during the last of July and the first part of August, there was a period where there were noticeable differences in corn growth under different rotations and fertilizer treatments—even though all the corn eventually was an almost complete failure because of the severe drouth.

The most obvious difference was on the different fertilizer treatments on plots that have been in continuous corn since 1915. Early in the season, corn plants were tallest on the highly fertilized plots. By mid-July, however, the corn on the highly fertilized plots had exhausted all available moisture and had ceased to grow, whereas the slower growing corn plants on the less highly fertilized plots were still making some growth.

These experiments are part of a long-term study to learn the effects of different crop rotations on the properties and productivity of the major soils of Iowa. W. D. Shrader, A. J. Englehorn, H. R. Meldrum, W. E. Larson, Orvis Engelstad, R. P. Nicholsen, W. N. Sutherland, John Pesek, W. H. Pierre, I. J. Johnson, Fred Stickler, W. F. Buchholtz, R. O. Hampton and Earl O. Heady are the key personnel working on this study.

P_2O_5 Water Solubility Not So Important When Plowed Under

THE DEGREE of water solubility of phosphorus is of lesser importance in fertilizers broadcast and plowed under for corn than it is in starter, row or hill fertilizers, where it is extremely important. This fact was emphasized by results from four Experiment Station tests in which phosphorus fertilizers, having a wide range of water solubility, were compared in plow-under applications for corn. The amount of available phosphorus in the different fertilizers in a water-soluble form varied from 10 to 100 percent. Each fertilizer was applied at rates of 30 and 60 pounds of P_2O_5 per acre.

Of particular interest, report John Webb and John Pesek, was the fact that the alumina nitric phosphates compared favorably with the other phosphorus sources tested. Alumina nitric phosphates, still in the experimental stage of development, are prepared from low-grade phosphate ore and have a high content of aluminum and iron. The other phosphorus sources tested were ammonium metaphosphate, concentrated superphosphate and monoammonium phosphate.

Drouth-Damaged Corn May Harm Livestock

UNDER DROUTH conditions, nitrates may accumulate in crop plants, and such accumulations of nitrates in forages are often posionous to livestock that feed on these forages.

Studies by John Hanway and coworkers at the Experiment Station showed high nitrate contents in corn, sorghum, soybeans and weeds growing in Iowa under drouth conditions. The amount of nitrates in the plants depended on the fertility level of the soil, the degree of drouth injury and the stage of plant development. Nitrates didn't accumulate in plants growing on soils of very low fertility. On moderate to high fertility soils, the nitrate content of corn plants increased as the degree of drouth injury increased.

Under drouth conditions, any practice which increased nitrogen availability in the soil—such as growing legumes in the rotation or applying manure or nitrogen fertilizer—increased the nitrate content of the plants. The nitrate content of the plants generally decreased as the plants matured, but mature corn plants were found that contained potentially poisonous levels of the nitrates.

Nitrates in drouth-damaged corn plants were concentrated largely in the lower part of the stalks below the ears. The nitrates didn't accumulate in the leaves, tassels or grain. Another finding was that cornstalks containing high concentrations of nitrates also contained high concentrations of potassium.

Some of the nitrates in corn plants were destroyed when the plants were ensiled. However, large quantities of nitrates remained in silage made from corn plants that originally contained high concentrations of nitrates.

Sound Fertilization Program in Rotation Pays Off in Long Run

A GOOD FERTILIZATION program in a rotation is highly profitable over a period of years, according to John Pesek who is directing an Experiment Station study on the time and rate of phosphorus application on Ida silt loam.

Though average yields of corn in 1955 were less than 4 bushels per acre because of extreme drouth, even the highest rate of P_2O_5 tested —240 pounds per acre in each 4-year rotation of COMM—was highly profitable over a period of years. This was true though the highest yields during the recent dry period (1953-56) were only about two-thirds the yields during a previous 3-year period (1950-52) when weather conditions were favorable for good corn yields and for responses to fertilizer.

The closer to the corn crop that the bulk of phosphorus fertilizer is applied, the better will be the corn

USDA and Experiment Station soil scientists at Iowa State College are studying the effects of the management of crop residues on the yields of following crops. (See "Crop Residue" item on this page and the "Nitrogen Availability" item, center column, third page of this section.)

yields. However, this gain in corn yields is obtained with some sacrifice of oats and meadow yields. At price levels in recent years, says Pesek, the gain in corn yield has more than offset the relatively small losses in oats and hay yields at this level of fertilization. This is in agreement with results reported by John Webb and H. R. Meldrum elsewhere in this report.

Study Timing Effects Of One Application Of P_2O_5 per Rotation

CAN ONE application of phosphate per rotation adequately supply the needs of all the crops in the rotation? If so, to what crop can it most profitably be applied? Since 1954, John Webb and H. R. Meldrum at the Experiment Station have been comparing the relative value of applying the major portion of the phosphorus to the corn or to the oat crop in a rotation on a Floyd silt loam in Howard County.

The P_2O_5 rates consist of 45 and 90 pounds per acre per 3-year rotation of corn, oats and mixed meadow. A starter fertilizer of 15 pounds of P_2O_5 is applied in the hill for corn. The remaining 30 or 75 pounds of P_2O_5 per rotation are plowed under for corn or disked in for oats.

Results through 1956 indicate that the efficiency of the phosphorus decreased as the length of time between the date of application and the date at which a crop was grown increased. So, if the phosphorus was applied to the corn crop, it was a matter of balancing the increase in corn yield against the decrease in oats and hay responses—and vice versa if the phosphorus was applied to the oat crop.

Average results from both P_2O_5 rates applied to the corn resulted in 5.5 bushels more corn, 5.2 bushels less oats and 0.25 ton less hay than if the phosphorus had been applied on the oats crop. When this gain of corn is balanced against the loss of oats and hay, it seems that, on the basis of current prices, there is little difference in returns from the two times of application. A choice between the two would probably depend on the value the individual farmer places on the various crops.

Crop Residue Effects On Yields Tested

RESEARCHERS at the Experiment Station are using both field and greenhouse studies to learn the effect of corn residues on the availability of soil nitrogen and of applied fertilizer nitrogen. They are also evaluating the effects of time of application of nitrogen fertilizer and corn residues on crop yields and nitrogen uptake.

Results of a field test on a Clarion loam show an average increase of over 9 bushels of oats per acre due to residue. This increased yield was probably caused by residue effect on soil moisture conservation. Those plots receiving residue remained green, while those plots that had not received residue showed blasting and ripened about 4 to 5 days earlier.

These studies, under the direction of John Pesek, will be continued to learn more of the effects of such residues. Future plans call for an experiment to study the effect of crop residues on the use of nitrogen by subsequent crops in the rotation.

Report Area Results From Fertilizer Trials

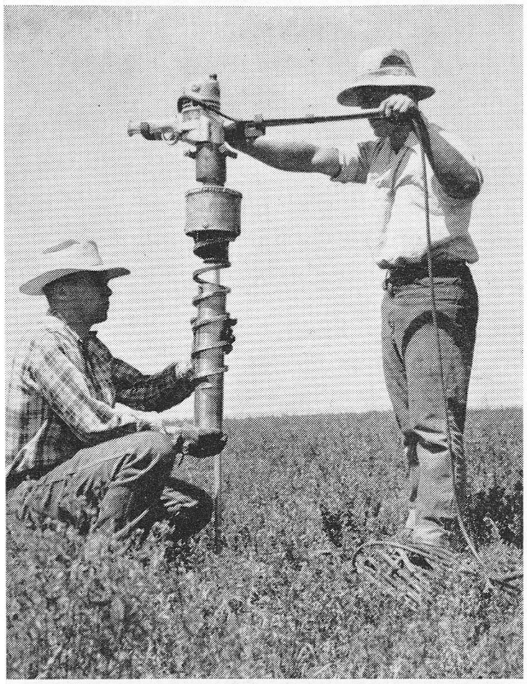
AS AN AID in making fertilizer recommendations for Iowa conditions, Experiment Station researchers conduct yearly corn yield trials at several Iowa locations to check fertilizer responses in these areas. Results for 1956 as reported by H. R. Meldrum, L. C. Dumenil and John Pesek are as follows:

Southeastern Iowa: Fertilizer responses on corn were variable in southeastern Iowa in 1956 because of low subsoil moisture in much of the area at planting time and because of varied rainfall during the growing season.

Fertilized corn yields were high on a Henry County location because rainfall was above normal in July and early August. Nitrogen gave the largest response on third-year corn. Broadcast phosphate was profitable when used with 80 pounds of nitrogen. Row fertilizer took care of the potash requirements. The highest yield was 103 bushels from 80 pounds each of nitrogen and P_2O_5 plus the row fertilizer.

On second-year corn in Washington County, none of the fertilizer treatments were very profitable. Subsoil moisture was low in the spring, but above-normal rainfall in July and August resulted in a good yield. However, early lack of moisture severely damaged the more rapidly growing fertilized corn. Nitrogen or phosphate fertilizer alone decreased the yield as much as 7 bushels, but the usually superior combinations of nitrogen and phosphate gave only small yield increases.

Fertilizer increases were most affected by lack of moisture on third-year corn in Lee County. The soil was mainly deficient in nitrogen and phosphorus. The most profitable treatment of 80 pounds of nitrogen plus row fertilizer yielded 56 bushels. Adding broadcast phosphate and potash to the nitrogen decreased yields—giving only 40 to 46 bushels. These decreases were due to the effects of phosphate and potash on corn silking dates and to the rainfall distribution. They hastened maturity to the point where the corn silked too far ahead of the rains in August.



These photos show a specially developed auger-type soil sampler to obtain undisturbed soil samples in studying the effects of subsoiling.

Northwest and west-central Iowa: Fertilizer responses in 1956 were also variable in northwest and west-central Iowa because of low subsoil moisture and low or poorly distributed summer rainfall. The soils tested low to medium in nitrogen and low in phosphorus, and corn followed soybeans in all fields.

Fertilizers often showed an unusual response pattern as reflected in a Greene County trial. In this case, all single treatments or lower combinations of treatments (up to 40-40-0) gave only small increases —up to 11 bushels; the heaviest combination (80-80-0) increased the yield by 30 bushels.

This odd effect was caused by maturity differences and the rainfall distribution. Little rain fell in the last half of July. All NP combinations had hastened maturity, but the 80-80-0 treatment had hastened silking enough so that it occurred before the severest moisture shortage. This corn developed longer and better-filled ears than corn with other combinations. On the other hand, the slowest maturing treatments had fewer pollination difficulties because they silked after the rains at the end of July.

Northeastern Iowa: Row fertilizer—150 pounds per acre of 5-20-20—gave the most consistent increases on corn in northeastern Iowa. The increases varied from 5 to 13 bushels in Winneshiek, Allamakee, Clayton and Dubuque counties. All of the fields in the trials were in first-year corn after meadow and tested low to medium in potassium.

Because of extremely favorable growing conditions in 1956 in this area, yields without fertilizer were high—averaging 93 bushels in the fields studied. Nitrogen gave increases on half of the fields; on these, 40 pounds of nitrogen increased yields from 6 to 11 bushels. Row fertilizer took care of phosphorus and potassium needs, except in two fields where increases from an additional 40 pounds of P_2O_5 plowed under were 5 and 9 bushels. Potash—40 pounds of K_2O—increased yields about 5 bushels above the row fertilizer yield in one field. In several fields, broadcast phosphate and potash gave profitable increases when used without the row fertilizer but were not profitable when the row fertilizer was used.

"Best" Corn Stand Depends on Weather

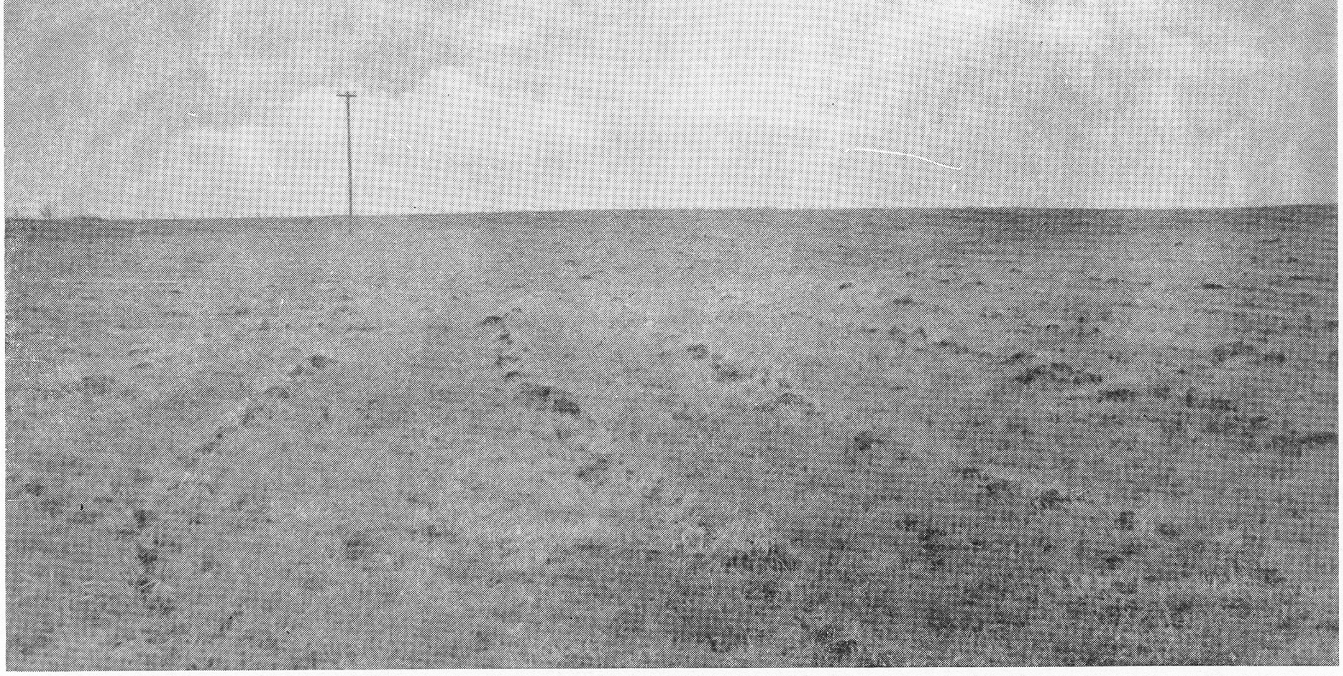
GETTING THE RIGHT stand for the growing conditions is one of the important management problems in corn production. Low stands often limit the yield levels possible and, therefore, often limit the response to fertilizers. This happens when conditions are good for high corn yields, but the catch is that sometimes such conditions don't develop in southern and western Iowa—and, perhaps, elsewhere.

A long-time experiment designed to study the relationship of stand and nitrogen fertility levels in producing yields of corn was established on Seymour silt loam in 1953. A similar experiment was established on Moody silt loam in 1956. Also, from time to time short-time experiments are conducted. In 1956, two such experiments were used to study stand effect on Shelby and Ida silt loams.

The available moisture in the subsoil at all locations was very low at planting time. Consequently, the outlook was for rather low corn yields. This turned out to be the case on the Moody and Ida silt loams where top yields were 36 and 44 bushels, respectively. But timely heavy rains in July coupled with favorable temperatures allowed yields to reach 69 and 79 bushels on the Seymour and Shelby soils.

A stand of about 8,000 plants per acre was enough to obtain highest possible yields on the Ida and Moody soils in western Iowa. On the other hand, there seemed to be an advantage to increasing the stand to 13,000 to 16,000 plants per acre in southern Iowa where moisture was more satisfactory.

Under similar initial soil moisture conditions on Seymour silt



Research by agronomists and agricultural engineers at Iowa State College so far has given little basis for recommending subsoiling in Iowa, though further tests are being continued. Photo above shows a field after it had been subsoiled. The subsoiling slots are about 7 feet apart.

loam in 1954 and 1955—but where yields were reduced by drouth—yields at 8,000 plants per acre averaged between 20 and 25 bushels, and increases in stand reduced yields in all cases. The same was true on Grundy silt loam in 1954. In these seasons, the lack of subsoil moisture and precipitation was accompanied by very high temperatures and low humidity during midsummer.

John Pesek, R. P. Nicholson and W. N. Sutherland report that continued work on this phase of corn production and in the area of weather prediction is needed to make sound recommendations based on yield expectations estimated from weather probabilities.

Subsoiling Shows No Yield Increases In College Tests

RECENTLY there have been several claims made about the value of subsoiling and deep fertilizer placement. Many people feel that breaking up of the "plow pan" (if such exists) allows water to penetrate the soil more rapidly. Others believe the "plow pan" layer restricts root development, and still others believe subsoiling aids drainage. Also it is claimed that deep fertilizer placement with subsoiling stimulates root growth in subsoil channels.

Because of this stimulated interest, agronomists and agricultural engineers at the Experiment Station conducted nine subsoiling and deep fertilizer placement experiments in the past 2 years—one in 1955 and eight in 1956. In view of these preliminary experiments, there seems to be little or no basis on which to recommend subsoiling or subsoil fertilizer placement at present, report W. E. Larson, W. G. Lovely and J. T. Pesek.

Two of the experiments were conducted on Galva soil and one each on Ida, Webster, Marshall, Grundy, Edina and Luton soils in north-central, western and southern Iowa. The treatments included subsoiling 16 and 24 inches deep and 40 inches apart, no subsoiling, placing the fertilizer in the subsoil channel, plowing the fertilizer under with and without subsoiling, and no fertilizer treatment.

The experiment on the Ida and Webster soils gave some response to fertilizer, but there was no advantage to placing the fertilizer 16 to 20 inches deep as compared with the conventional plowdown. In general, the trend in this and other experiments showed that deep placement of fertilizer is probably not as effective as plowdown without subsoiling.

Yields were reduced on the Edina and Galva soils because of subsoiling. In general, the shallow subsoiling caused smaller yield decreases than the deep subsoiling. In no case did subsoiling produce a yield increase.

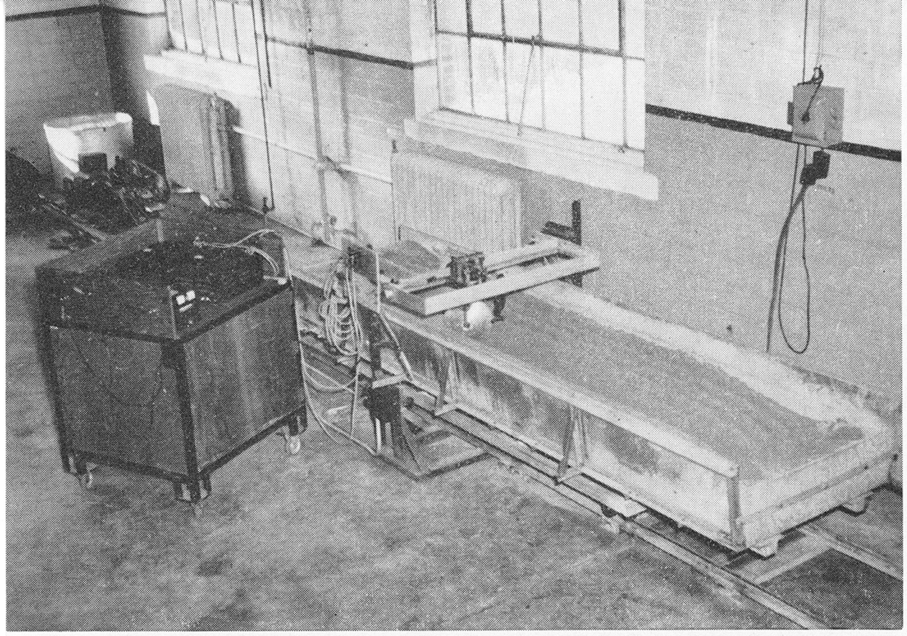
The experiment on the Luton soil compared surface planting and loose listing with subsoiling at 16 inches and no subsoiling. Yields were lower than normal because of drouth conditions. Subsoiling reduced yields for both methods of planting.

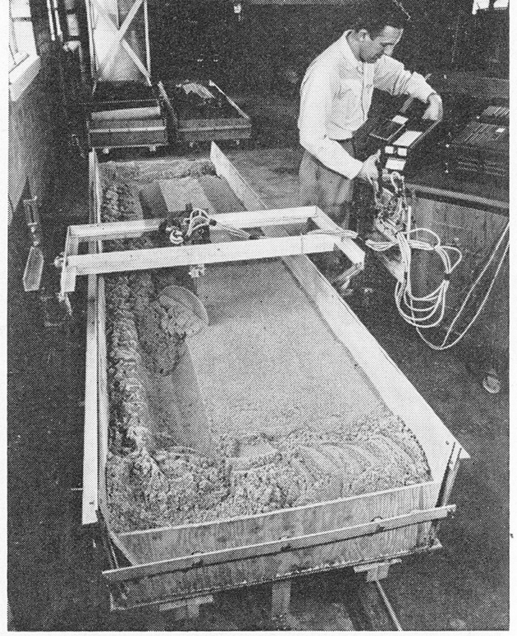
Undisturbed soil samples were taken from the Marshall and Webster subsoiling experiments to learn how the bulk density of the soil was influenced by the subsoiling treatment. The samples were taken in the corn row which was about in the slot where the subsoiler had run. A specially developed auger-type soil sampler was used to get undisturbed samples (see photos). Results showed that deep tillage reduced the bulk density of the soil in only one case, and the differences were small. In all cases the bulk density values were about normal for these soils.

Future plans call for continuing some of these studies and measuring residual effects of old treatments.

Soybean Response To Fertilization Depends on Soil

SOYBEANS in past experiments have shown little response to direct fertilization, except on soils testing very low in available nutrients.





The two photos above show some of the laboratory equipment used in model studies of tillage machinery at the Experiment Station. The close-up view at right shows the soil bar mounted on tracks, the mounting bracket for tillage tools and the force-recording mechanism in operation.

Generally, soybeans have not responded as profitably to fertilizer as have other crops in the rotation.

In Experiment Station trials in 1956, soybean yield increases were found to be about the same from commercial fertilizer as from manure broadcast and disked in at rates to give equal amounts of available nitrogen, phosphorus and potassium. This experiment was located on a Floyd silt loam. The results indicated that most of the response was from the phosphorus and potassium.

Phosphate increased soybean yields by as much as 5.6 bushels per acre on a Nicollet loam testing very low in phosphorus and low in nitrogen in Wright County in 1956. Nitrogen had no effect on yield. Combinations of nitrogen and phosphorus were broadcast before disking. The most profitable rate of fertilizer was between 30 and 60 pounds of P_2O_5.

Irrigation increased 1956 yields in an experiment at Ames, but leaf spray of nutrients and a synthetic auxin had little effect. The nutrients—nitrogen, phosphate and potash—were sprayed on the leaves at four different times. The total amounts of nutrients applied were 13 pounds of nitrogen, 3.25 pounds of P_2O_5 and 6.27 pounds of potash. An application of a synthetic auxin was sprayed on the leaves at full bloom stage and also during the pod filling stage.

The lack of response from leaf spray applications of nitrogen, phosphate and potash was probably because of the high level of fertility of the soil. The soil tested medium in nitrogen, high in phosphorus and medium in potassium.

R. J. Miller, L. C. Dumenil, H. R. Meldrum, John Pesek and W. H. Pierre are key personnel conducting these fertilizer experiments.

Compare New Ways To Prepare Seedbed

MANY IOWA farmers are showing interest in some of the newer seedbed preparation methods for corn. To help answer their questions about the use of these seedbed preparation methods on different soil types, Experiment Station and USDA agricultural engineers and agronomists have conducted a number of experiments over the state.

In experiments at Ames on Colo clay loam, at Shenandoah on Marshall silt loam and at Doon on Moody silt loam, the effects of five different seedbed preparation methods on the yields of corn were compared. Methods tested were: conventional plowing, mulch tillage, tractor track planting, ridge planting and listing.

W. E. Larson and W. G. Lovely report that there were no meaningful differences in yields from the five different methods at Ames and Shenandoah. At Doon, however, yields from ridge planting and listing were much better than those from the conventional planting method. For example, yields from listing were about 21 bushels greater than from conventional. This result may indicate that listing or ridging produces better yields than conventional planting under drouth conditions like those at Doon in 1956.

Experiments comparing loose-ground listing and surface planting of first-year corn after meadow and hard-ground listing and surface planting of second-year corn after meadow have been conducted at Beaconsfield on Grundy silt loam and at Castana on Ida-Monona silt loam for a number of years.

In 1956 at Beaconsfield, the average yields for surface planting and loose-ground listing first-year corn were 87.2 and 80.2 bushels per acre, respectively. Surface planting and hard-ground listing of second-year corn produced yields of 88.7 and 91.0 bushels per acre, respectively. The average yields for the last 4 years for the two methods of seedbed preparation were not meaningfully different. Yields of corn during 1956 in the experiment at Castana were very low because of lack of moisture.

The researchers are also developing equipment to test small scale models of tillage machinery in the laboratory. The laboratory apparatus for testing the various forces on a tillage implement are shown in the photos. Various Iowa soils are used in these tests.

Farm Outlook...

by Francis A. Kutish

NET FARM INCOME in the United States dropped 23 percent between early 1951 and 1955. This decline in farm income ended during the latter part of 1956. When figured for the year as a whole, 1956 farm income turned out to be about 4 percent greater than in 1955—mainly because of soil bank and wool incentive payments, however.

Net farm income in 1957 was up just a shade for the nation from 11.07 billion dollars estimated for 1956. Soil bank payments accounted for most of the increase; for, otherwise, farm expenses were up just about as much as gross farm income. The outlook for 1958 is for little change from 1957.

The nub of the farm problem continues to be "a little too much output in total" each year. We're producing more than we can sell at prices most farmers consider satisfactory. And the 1957 feed grain output was larger than we're using—despite the soil bank and acreage allotments. Farm output in total was larger in 1957 than in 1956; and, therefore, a new record. Prospects for a general reduction of farm stocks in 1958 are not bright.

To get our farm plant back in balance, we'd need to cut back farm output 5-6 percent from 1956 levels—and hold it there for the next 4 years. This would get our large carryover stocks back to reasonable size. Then yearly production could increase again at about the same rate it has in recent years.

Looking beyond 1958, American agriculture will continue to face the difficult problem of balancing production and market demand at favorable prices. For several years ahead, our problem is likely to be one of surpluses, not shortages.

So far neither individual farmers nor the USDA have been able to control production very effectively. Experience with the soil bank has demonstrated once again the difficulty of preventing surpluses by attempting to reduce the output of farm products. More effective methods of control may possibly be found in the future. For example, there's now some interest in quantity allotments in place of acreage allotments as such.

Some real progress has been made with programs to increase consumption. The "480" program has been markedly successful in stimulating exports of farm products. In the domestic market, the USDA continues to move large quantities of food into consumption through school lunches, school milk programs and distribution of surplus foods to institutions and to needy families.

But even with all of these programs, we're still faced with surpluses—especially of feed grains. We face two possible alternatives—neither of them easy. One is to sharply decrease the production of feed grains. The other is to increase the output of livestock products beyond previous record levels.

Meat . . .

Meat production last year dropped from the record level set in 1956. It will continue large in 1958 but below the levels of 1957. There'll be less beef, but more of the beef will be grain fed. Table 1 shows how the meat picture stacks up in terms of pounds of meat per person.

Consumption of poultry meat has risen steadily in recent years as the commercial production of broilers and turkeys has expanded. The average consumer ate about 25.3 pounds of chicken and 5.8 pounds of turkey last year. Early indications are that the supply of chicken will be larger in 1958,

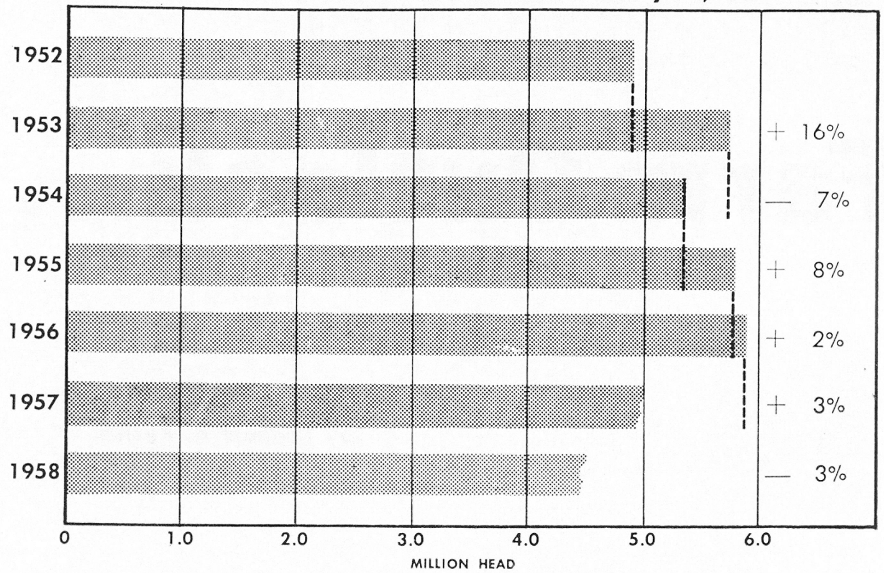
Table 1. Pounds of Meat Consumed per Person in the United States, 1947-58.

	1947-49	1953	1954	1955	1956	1957	1958 (estimated)
Beef	65	77.6	80.1	82.0	85.0	83.8	81.0
Veal	10	9.5	10.0	9.4	9.5	9.0	8.6
Pork	67	63.5	60.0	66.8	67.5	62.0	64.0
Lamb, mutton	5	4.7	4.6	4.6	4.2	4.2	4.2
TOTAL	147	155.3	154.7	162.8	166.4	159.0	157.8
Chicken	18.5	21.9	22.8	21.4	24.7	25.3	25.8
Turkey	3.2	4.8	5.3	5.0	5.2	5.8	5.8

FRANCIS A. KUTISH is professor of agricultural economics.

with turkey supplies about the same as last year.

Cattle and Calves on Feed January 1, 1952-58



Hogs

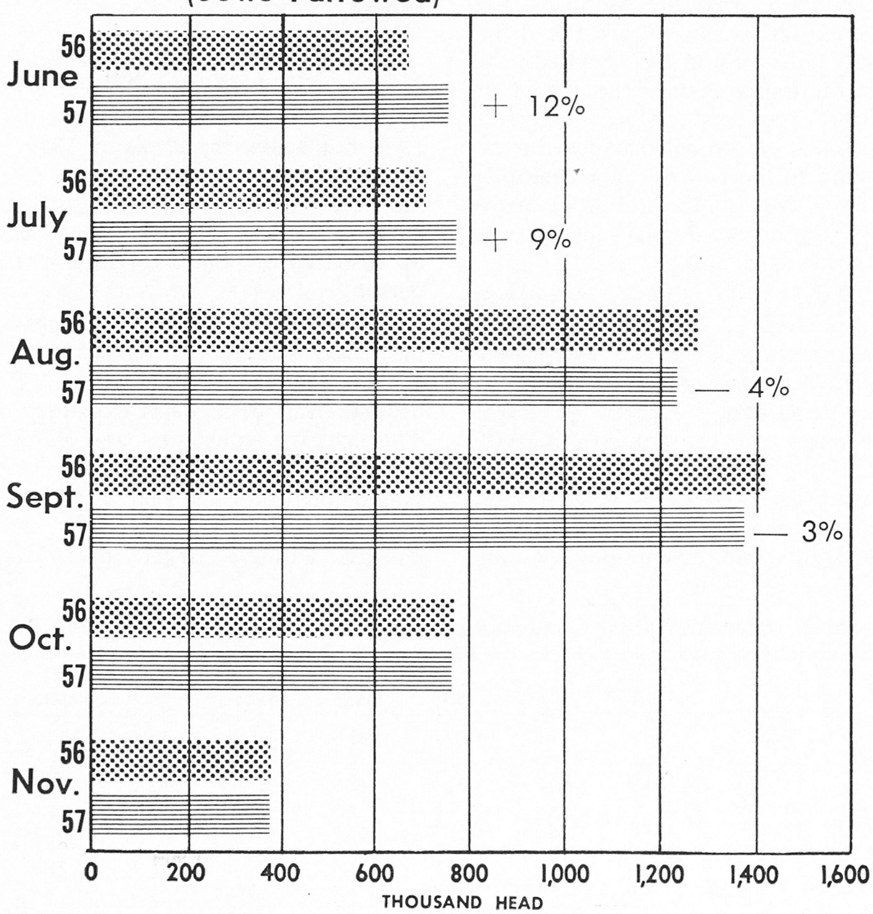
Hog production began to increase again with the expansion in hog numbers with the 1957 fall pig crop. The fall crop was up 2 percent, with the increase in June and early July litters.

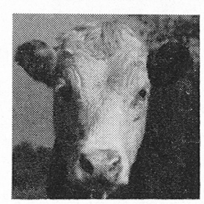
On Dec. 1 farmers were planning to increase farrowings 6 percent during the spring of 1958. And remember that the fall 1957 pig crop was up 2 percent from the 1956 fall crop. With all of the increase in June and July litters, most of these hogs were coming to market in January and February just past. August and September farrowings, on the other hand were a little lower than a year ago. This indicates that current March and April marketings aren't going to be much different than last year—unless considerable numbers of hogs are held back and fed to heavier weights. Prices from about now through spring should average as high as last year.

Less pork products are in storage than a year ago. This will partially offset the larger summer marketings. Stocks of bellies, in particular, are down.

Next fall's slaughter will be about 5 percent larger than slaughter last fall—if farmers follow through on their Dec. 1 farrowing plans. This would mean moderately lower prices next fall compared with a year ago—but not "disastrous" prices. Thus, the hog-corn ratio is expected to be favorable throughout 1958. This will encourage a further rise in the 1958 fall pig crop and in the 1959 spring crop.

Fall Farrowings, 1956-57
(Sows Farrowed)





Cattle

Beef cattle numbers have decreased for the last 2 years. Normally, we'd expect the downtrend in the cattle cycle to continue for the next few years. Cattlemen began holding back cows and calves last fall, however. And—if good grass continues—there'll be a strong incentive to halt the downturn in numbers.

Numbers aren't expected to change greatly in 1958. Profits from cattle feeding are likely to be good during the next year or two. If weather is good in the grazing areas, feeder cattle are likely to sell high compared with fat cattle. With large supplies of cheap feed, pressure will be strong to feed cattle. Thus, much of the effects of cheaper feed will be bid by feeders into the hands of the men who raise cattle.

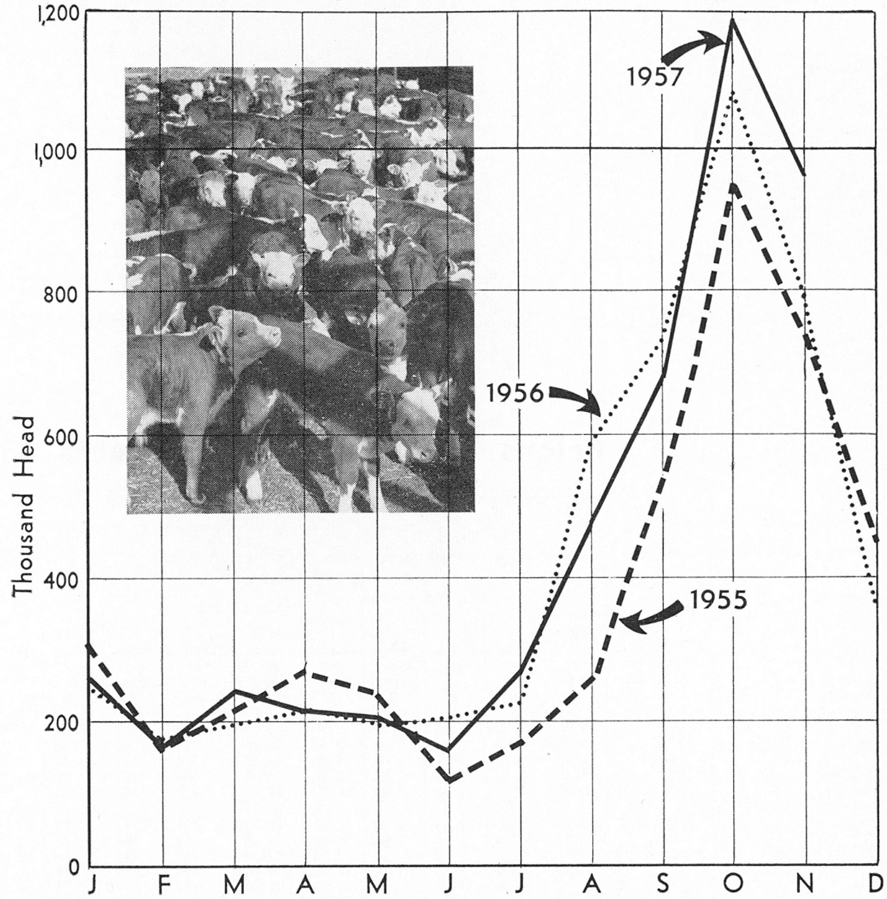
Dairy

The dairy outlook for 1958 is dominated by the April 1 drop in support levels to 75 percent of parity. Farm prices of dairy products will continue near support levels.

Demand for dairy products will be a little stronger this year, but production is likely to be up by about the same amount. Total milk output will reach about 128-129 billion pounds in 1958—compared with 127 billion pounds in 1957.

So it looks as if dairy supplies won't be brought into balance with demand at prices prevailing in 1958 despite the lower support rates. Supports will pull 4-5 billion pounds of milk in the form of various dairy products off the market and into government hands during the year.

Feeder Cattle In-shipments Into Nine Corn Belt States



Poultry and Eggs . . .

There'll be more money in egg production this winter than a year ago because of the relatively smaller egg production. Table 2 shows how the egg consumption situation looks on a per-person basis for the entire year.

TABLE 2. Number of Eggs Consumed per Person in the United States, 1954-58

Year	Number of eggs
1954	371
1955	371
1956	369
1957	360
1958*	350

*Estimated.

Feed costs, meanwhile, will be lower. Total number of chicks bought last spring were about one-fifth below 1956. This means fewer layers until next fall.

The increase in rate of lay, however, will offset much of this cutback. Still, with population growing as it is, the supply of eggs per person should be down slightly from a year ago. This means that profits on pullets bought this spring should be better than on those bought in the spring of 1956.

to

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Prices of Iowa Farm Products (1930-1957)

Published in cooperation with the Iowa Crop and Livestock Reporting Service

Year and Month	Corn per bu. $	Oats per bu. $	Wheat per bu. $	Soy-beans per bu. $	All hay per ton $	Hogs per cwt. $	Cattle per cwt. $	Sheep per cwt. $	Lambs per cwt. $	Milk cows per head $	Chickens per lb. $	Eggs per doz. $	Butter-fat per lb. $	Wool per lb. $	Hog-Corn ratio	Butter-fat-Feed ratio	Egg-Feed ratio	Index of prices received by farmers (Iowa)[1]	Index of prices received by farmers (U.S.)[1]	Index of prices paid, interest, taxes & wage rates (U.S.)[1]	Parity ratio (U.S.)[2]
1930....	.70	.33	.82	......	9.30	8.80	9.10	4.60	8.20	77.00	.160	.197	.36	.20	12.9	29.0	12.7	126	125	151	83
1931....	.43	.22	.51	......	8.30	5.60	6.50	2.90	5.80	50.00	.144	.148	.26	.13	13.0	33.6	15.4	87	87	130	67
1932....	.23	.16	.38	......	7.70	3.20	4.95	2.00	4.60	34.00	.101	.113	.19	.09	15.1	38.8	20.5	58	65	112	58
1933....	.27	.20	.59	.65	5.30	3.40	4.40	2.25	5.30	32.00	.080	.111	.20	.22	14.6	35.2	14.6	58	70	109	64
1934....	.55	.38	.83	1.23	10.90	4.05	5.20	2.80	6.10	33.00	.106	.143	.24	.21	8.1	22.4	11.4	78	90	120	75
1935....	.73	.36	.90	1.05	11.40	8.70	7.30	3.80	7.60	49.00	.143	.213	.30	.20	12.6	24.4	14.9	119	109	124	88
1936....	.74	.31	.98	.89	8.60	9.30	6.70	3.80	8.20	54.00	.139	.188	.34	.28	14.3	30.1	12.6	120	114	124	92
1937....	.93	.38	1.09	1.18	10.20	9.40	8.20	4.10	9.00	59.00	.162	.183	.35	.33	11.9	26.2	11.2	134	122	131	93
1938....	.42	.21	.67	.76	6.60	7.60	7.80	3.15	7.40	59.00	.129	.170	.28	.18	18.8	34.6	16.6	103	97	124	78
1939....	.39	.26	.64	.73	5.50	6.00	8.40	3.50	8.00	62.00	.116	.136	.25	.22	16.4	30.0	11.4	95	95	123	77
1940....	.52	.31	.77	.81	6.10	5.30	8.90	3.60	8.40	65.00	.122	.144	.29	.30	10.5	29.8	11.3	98	100	124	81
1941....	.58	.34	.88	1.18	6.80	9.20	10.00	4.80	9.90	77.00	.144	.206	.35	.38	16.0	31.8	13.8	129	124	133	93
1942....	.73	.46	1.06	1.61	8.40	13.10	11.90	5.70	12.10	95.00	.182	.278	.41	.40	18.2	29.2	13.8	167	159	152	105
1943....	.92	.63	1.29	1.67	12.90	13.80	13.50	6.50	13.50	119.00	.227	.347	.52	.43	15.1	28.2	14.2	189	193	171	113
1944....	1.00	.71	1.46	1.92	14.80	13.20	12.20	5.90	13.20	110.00	.228	.298	.52	.43	13.3	25.6	11.7	184	197	182	108
1945....	.98	.66	1.51	2.09	15.90	14.00	13.50	6.50	13.40	115.00	.235	.331	.52	.43	14.3	26.4	13.6	194	207	190	109
1946....	1.30	.74	1.74	2.31	14.90	17.50	15.90	7.70	16.00	143.00	.281	.326	.67	.44	13.7	28.2	11.5	234	236	208	113
1947....	1.84	.95	2.38	3.22	16.10	23.80	20.90	8.10	21.10	166.00	.240	.385	.77	.42	13.9	24.6	10.6	308	276	240	115
1948....	1.85	.94	2.18	3.14	21.50	22.80	24.70	9.40	23.30	198.00	.276	.400	.86	.44	13.2	26.6	11.0	322	287	260	110
1949....	1.12	.62	1.94	2.17	20.00	17.50	21.80	8.50	23.00	188.00	.209	.386	.65	.44	16.1	30.8	13.6	255	250	251	100
1950....	1.28	.73	2.01	2.46	16.70	17.70	25.30	10.00	25.30	212.00	.200	.292	.66	.56	14.1	27.4	9.6	270	258	256	101
1951....	1.58	.88	2.16	2.89	16.60	19.70	31.10	14.00	31.40	266.00	.220	.397	.75	.92	12.6	25.9	11.3	317	302	282	107
1952....	1.56	.84	2.14	2.79	17.20	17.40	27.30	7.60	24.90	248.00	.194	.326	.80	.50	11.4	27.8	9.3	290	288	287	100
1953....	1.37	.74	1.98	2.59	18.60	21.10	19.30	5.00	20.30	185.00	.199	.399	.72	.52	15.6	27.9	12.4	273	258	279	92
1954....	1.42	.74	2.03	3.01	18.80	21.00	19.60	5.00	19.50	162.00	.140	.282	.63	.51	15.1	24.7	8.3	267	249	281	89
1955....	1.31	.64	2.00	2.24	16.70	15.00	19.00	4.60	18.90	155.00	.180	.321	.62	.42	11.4	26.6	10.5	230	237	281	84
1956....	1.31	.67	1.99	2.39	18.59	14.20	18.10	4.10	18.90	168.00	.147	.318	.64	.42	11.0	24.9	10.5	224	235	286	82
1957[3]...	1.10	.66	1.96	2.15	16.77	17.60	20.10	5.20	19.90	178.00	.114	.286	.63	.50	16.2	26.6	10.1	240	242	296	82
1956																					
Jan.....	1.21	.61	1.95	2.19	17.60	10.70	16.20	4.00	17.40	155.00	.171	.368	.63	.40	8.8	26.2	12.8	197	226	281	80
Feb.....	1.21	.61	1.96	2.23	16.90	12.00	16.00	4.60	18.20	160.00	.170	.317	.63	.41	9.9	25.6	11.0	201	227	280	81
Mar.....	1.21	.61	1.99	2.35	16.50	12.60	16.20	4.80	18.60	170.00	.176	.334	.63	.41	10.4	25.1	11.6	206	228	281	81
April....	1.33	.61	2.06	2.61	16.40	14.40	17.20	4.60	18.50	165.00	.176	.332	.63	.42	10.8	24.8	11.1	221	235	284	83
May....	1.41	.63	2.01	2.96	18.90	15.40	17.70	4.10	22.00	170.00	.170	.333	.64	.42	10.9	24.5	10.7	231	240	286	84
June....	1.43	.65	1.95	2.87	18.50	15.50	18.00	4.00	21.00	165.00	.161	.315	.64	.42	10.8	24.3	10.1	231	245	286	86
July....	1.44	.68	1.90	2.41	19.80	15.10	18.40	4.00	19.50	170.00	.149	.301	.64	.40	10.5	23.8	9.5	230	243	287	85
Aug.....	1.47	.72	1.95	2.37	19.80	16.20	21.00	4.20	19.40	175.00	.144	.300	.64	.38	11.0	23.3	9.4	245	236	287	82
Sept.....	1.44	.71	2.02	2.05	19.20	15.60	21.30	4.20	19.20	175.00	.118	.325	.65	.41	10.8	23.9	10.2	243	236	287	82
Oct.....	1.21	.71	2.02	2.08	18.80	15.40	20.10	3.90	18.20	170.00	.105	.311	.66	.45	12.7	25.4	10.3	232	234	288	81
Nov.....	1.21	.73	2.06	2.26	19.60	14.00	19.00	4.20	18.00	170.00	.107	.297	.66	.46	11.6	26.4	9.9	222	234	289	81
Dec.....	1.20	.76	2.02	2.26	21.10	16.00	17.00	4.00	17.80	170.00	.114	.287	.66	.48	13.3	25.6	9.5	224	235	290	81
1957[3]																					
Jan.....	1.19	.76	2.07	2.30	20.10	17.50	17.20	4.20	18.10	165.00	.114	.243	.64	.48	14.7	24.8	8.0	231	238	292	82
Feb.....	1.14	.73	2.10	2.21	19.40	16.30	17.10	5.00	19.10	170.00	.119	.248	.64	.50	14.3	24.2	8.3	224	234	294	80
Mar.....	1.14	.73	2.06	2.24	19.30	17.00	18.10	5.30	20.50	165.00	.122	.238	.63	.48	14.9	24.5	8.0	231	237	295	80
April....	1.18	.73	2.06	2.23	18.30	17.40	19.30	5.30	21.10	170.00	.118	.246	.63	.47	14.7	26.2	8.2	237	241	296	81
May....	1.20	.71	1.99	2.18	17.90	17.20	20.00	5.00	20.50	175.00	.117	.220	.64	.54	14.3	27.4	7.4	238	243	296	82
June....	1.21	.67	1.89	2.14	15.40	18.10	20.60	5.00	20.00	175.00	.109	.227	.64	.54	15.0	27.8	7.7	244	244	296	82
July....	1.20	.59	1.89	2.18	15.30	18.90	22.00	4.50	19.50	185.00	.110	.252	.63	.54	15.8	26.7	8.7	253	247	295	84
Aug.....	1.18	.57	1.91	2.21	15.20	19.80	22.00	4.80	20.50	190.00	.117	.304	.63	.52	16.8	26.2	10.6	259	248	295	84
Sept.....	1.07	.58	1.90	2.07	14.30	19.00	21.30	5.70	20.50	185.00	.114	.344	.63	.52	17.8	26.7	12.4	251	245	296	83
Oct.....	1.00	.59	1.88	2.00	15.20	16.60	20.60	5.70	19.20	185.00	.105	.376	.63	.50	16.6	27.4	13.8	235	240	296	81
Nov.....	.88	.60	1.91	1.99	14.80	16.50	21.30	5.50	20.00	185.00	.107	.377	.63	.49	18.8	28.6	14.2	235	242	298	81
Dec.....	.85	.61	1.92	2.00	16.00	17.50	21.40	5.90	20.30	185.00	.115	.354	.63	.48	20.6	28.9	13.6	240	242	299	81

[1]1910-14=100.
[2]Ratio of Index of Prices Received to Index of Prices Paid, Interest, Taxes and Wage Rates.
[3]Preliminary.

24-736